On some mathematical connections between ϕ, ζ(2), the Rogers-Ramanujan identities, the Holographic Proton Mass, some like-particle solutions and the Black Hole Entropies. II

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Abstract

In the present research thesis, we have obtained various and interesting new mathematical connections concerning ϕ, ζ(2), the Rogers-Ramanujan identities, the Holographic Proton Mass, some like-particle solutions and the Black Hole Entropies.

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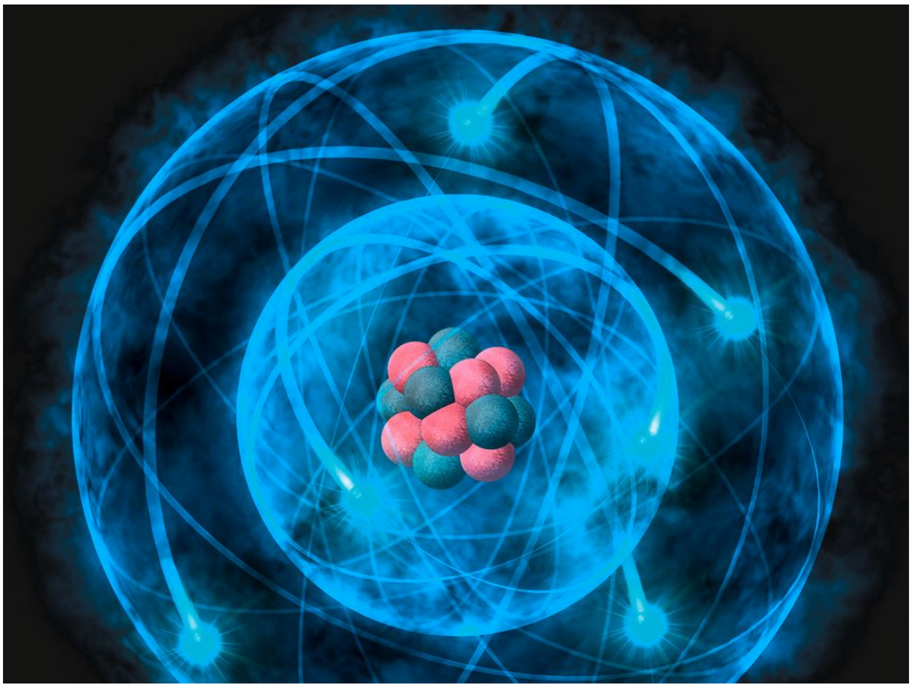
https://resonance.is/the-schwarzschild-proton/



https://www.quantamagazine.org/three-puzzles-inspired-by-ramanujan-20160714/

$$\cfrac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+\cfrac{e^{-10\pi}}{\ddots}}}}}} = \left(\sqrt{\frac{5+\sqrt{5}}{2}} - \frac{1+\sqrt{5}}{2}\right) e^{2\pi/5}$$

https://googology.wikia.org/wiki/Srinivasa_Ramanujan

Golden Ratio, *e* and *Pi* in a wonderful Ramanujan Formula

$$\cfrac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+\cfrac{e^{-10\pi}}{\ddots}}}}}} = \left(\sqrt{\frac{5+\sqrt{5}}{2}} - \frac{1+\sqrt{5}}{2}\right)e^{2\pi/5}$$

Golden Ratio, e and PI

1/((1+((e^(-2Pi)))/((1+((e^(-4Pi)))/((1+((e^(-6Pi)))/((1+((e^(-8Pi)))/((1+((e^(-10Pi)))

Input:

$$\cfrac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+e^{-10\pi}}}}}}$$

Decimal approximation:

0.998136044598509332150024459047074735311382994763043982185...

0.99813604…

Property:

$$\cfrac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+e^{-10\pi}}}}}}$$ is a transcendental number

- **Alternate forms:**

$$\cfrac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}+e^{4\pi}}{1+e^{2\pi}+e^{10\pi}}}}}$$

- $$1+\frac{-1-e^{6\pi}-e^{8\pi}-e^{10\pi}-e^{16\pi}}{1+e^{2\pi}+e^{4\pi}+2\,e^{6\pi}+2\,e^{8\pi}+2\,e^{10\pi}+e^{12\pi}+e^{14\pi}+e^{16\pi}+e^{18\pi}}$$

- $$\frac{e^{2\pi}\left(1+e^{2\pi}+e^{4\pi}+e^{6\pi}+e^{8\pi}+e^{10\pi}+e^{12\pi}+e^{16\pi}\right)}{1+e^{2\pi}+e^{4\pi}+2\,e^{6\pi}+2\,e^{8\pi}+2\,e^{10\pi}+e^{12\pi}+e^{14\pi}+e^{16\pi}+e^{18\pi}}$$

Alternative representations:

$$\frac{1}{1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\frac{e^{-8\pi}}{1+e^{-10\pi}}}}}}=\frac{1}{1+\frac{e^{-360^\circ}}{1+\frac{e^{-720^\circ}}{1+\frac{e^{-1080^\circ}}{1+\frac{e^{-1440^\circ}}{1+e^{-1800^\circ}}}}}}$$

- $$\frac{1}{1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\frac{e^{-8\pi}}{1+e^{-10\pi}}}}}}=\frac{1}{1+\frac{\exp^{-2\pi}(z)}{1+\frac{\exp^{-4\pi}(z)}{1+\frac{\exp^{-6\pi}(z)}{1+\frac{\exp^{-8\pi}(z)}{1+\exp^{-10\pi}(z)}}}}} \quad \text{for } z=1$$

- $$\frac{1}{1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\frac{e^{-8\pi}}{1+e^{-10\pi}}}}}}=\frac{1}{1+\frac{e^{2i\log(-1)}}{1+\frac{e^{4i\log(-1)}}{1+\frac{e^{6i\log(-1)}}{1+\frac{e^{8i\log(-1)}}{1+e^{10i\log(-1)}}}}}}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

$$\frac{1}{1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\frac{e^{-8\pi}}{1+e^{-10\pi}}}}}}=\frac{1}{1+\frac{e^{-8\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+\frac{e^{-16\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+\frac{e^{-24\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+\frac{e^{-32\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+e^{-40\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}}}}}$$

-

$$\frac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+e^{-10\pi}}}}}} = \left(\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}\left(1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{4\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{6\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{8\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{10\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{12\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{16\pi}\right)\right) \Big/ \left(1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{4\pi}+2\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{6\pi}+2\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{8\pi}+2\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{10\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{12\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{14\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{16\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{18\pi}\right)$$

$$\frac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+e^{-10\pi}}}}}} = \frac{1}{1+\cfrac{\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-8\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+\cfrac{\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-16\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+\cfrac{\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-24\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+\cfrac{\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-32\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}{1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-40\sum_{k=0}^{\infty}(-1)^k/(1+2k)}}}}}}$$

$n!$ is the factorial function

Integral representations:

$$\frac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+e^{-10\pi}}}}}} = \frac{1}{1+\cfrac{e^{-8\int_0^1\sqrt{1-t^2}\,dt}}{1+\cfrac{e^{-16\int_0^1\sqrt{1-t^2}\,dt}}{1+\cfrac{e^{-24\int_0^1\sqrt{1-t^2}\,dt}}{1+\cfrac{e^{-32\int_0^1\sqrt{1-t^2}\,dt}}{1+e^{-40\int_0^1\sqrt{1-t^2}\,dt}}}}}}$$

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$$\frac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+e^{-10\pi}}}}}} = \frac{1}{1+\cfrac{e^{-16/3\int_0^{\infty}\sin^3(t)/t^3\,dt}}{1+\cfrac{e^{-32/3\int_0^{\infty}\sin^3(t)/t^3\,dt}}{1+\cfrac{e^{-16\int_0^{\infty}\sin^3(t)/t^3\,dt}}{1+\cfrac{e^{-64/3\int_0^{\infty}\sin^3(t)/t^3\,dt}}{1+e^{-80/3\int_0^{\infty}\sin^3(t)/t^3\,dt}}}}}}$$

- $$\frac{1}{1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\frac{e^{-8\pi}}{1+e^{-10\pi}}}}}} = \frac{1}{1+\frac{e^{-2\left(\frac{3\sqrt{3}}{4}+24\int_0^{\frac{1}{4}}\sqrt{t-t^2}\,dt\right)}}{1+\frac{e^{-4\left(\frac{3\sqrt{3}}{4}+24\int_0^{\frac{1}{4}}\sqrt{t-t^2}\,dt\right)}}{1+\frac{e^{-6\left(\frac{3\sqrt{3}}{4}+24\int_0^{\frac{1}{4}}\sqrt{t-t^2}\,dt\right)}}{1+\frac{e^{-8\left(\frac{3\sqrt{3}}{4}+24\int_0^{\frac{1}{4}}\sqrt{t-t^2}\,dt\right)}}{1+e^{-10\left(\frac{3\sqrt{3}}{4}+24\int_0^{\frac{1}{4}}\sqrt{t-t^2}\,dt\right)}}}}}}$$

[((((sqrt(((((5+sqrt(5))/2)))))))) – ((((((1+sqrt(5)))/2))))))))] e^(2Pi/5)

Input:

$$\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{2\times\pi/5}$$

Exact result:

$$\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}$$

Decimal approximation:

0.998136044598509332150024459047074735311382994763043982185...

0.99813604…

Property:

$$\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}$$ is a transcendental number

- **Alternate forms:**

$$-\frac{1}{2}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}$$

- $$\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}$$

- $$-\frac{1}{2} e^{(2\pi)/5} - \frac{1}{2}\sqrt{5}\, e^{(2\pi)/5} + \sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\, e^{(2\pi)/5}$$

Series representations:

$$\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)} - \frac{1}{2}\left(1+\sqrt{5}\right)\right) e^{(2\pi)/5} = -\frac{1}{2} e^{(2\pi)/5} + \sum_{k=0}^{\infty} 2^{-1-2k} e^{(2\pi)/5} \binom{\frac{1}{2}}{k} \left(3+\sqrt{5}\right)^{-k} \left(-\sqrt{4}\left(3+\sqrt{5}\right)^{k} + 2^{1+3k}\sqrt{\frac{1}{2}\left(3+\sqrt{5}\right)}\right)$$

- $$\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)} - \frac{1}{2}\left(1+\sqrt{5}\right)\right) e^{(2\pi)/5} = -\frac{1}{2} e^{(2\pi)/5} + \sum_{k=0}^{\infty} \frac{(-1)^k\, 2^{-1-2k}\, e^{(2\pi)/5} \left(-\frac{1}{2}\right)_k \left(3+\sqrt{5}\right)^{-k} \left(-\sqrt{4}\left(3+\sqrt{5}\right)^{k} + 2^{1+3k}\sqrt{\frac{1}{2}\left(3+\sqrt{5}\right)}\right)}{k!}$$

- $$\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)} - \frac{1}{2}\left(1+\sqrt{5}\right)\right) e^{(2\pi)/5} = -\frac{1}{2} e^{(2\pi)/5} + \sum_{k=0}^{\infty} \frac{(-1)^{1+k}\, 2^{-1-k}\, e^{(2\pi)/5} \left(-\frac{1}{2}\right)_k \sqrt{z_0} \left(-2\left(5+\sqrt{5}-2z_0\right)^{k} + 2^{k}\left(5-z_0\right)^{k}\right) z_0^{-k}}{k!}$$

for not $((z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

Thence:

$$\cfrac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cfrac{e^{-8\pi}}{1+\cfrac{e^{-10\pi}}{\ddots}}}}}} = \left(\sqrt{\frac{5+\sqrt{5}}{2}} - \frac{1+\sqrt{5}}{2}\right) e^{2\pi/5}$$

$0.99813604459850933215002445904707473531138299476304398218 5... =$

$0.99813604459850933215002445904707473531138299476304398218 5...$

-1/ ln(((((((([((((sqrt(((((5+sqrt(5))/2)))))))) – ((((((1+sqrt(5)))/2)))))))))] e^(2Pi/5))))))))

Input:

$$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{2\times\pi/5}\right)}$$

$\log(x)$ is the natural logarithm

Exact result:

$$-\frac{1}{\log\left(\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}$$

Decimal approximation:

535.99336749293263194912941393216127545349562052644311400 01...

535.993367…

Alternate forms:

$$-\frac{1}{\log\left(\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}$$

- $$-\frac{5}{2\pi+5\log\left(\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)\right)}$$

- $$-\frac{1}{\frac{2\pi}{5}+\log\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)}$$

Alternative representations:

$$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}=-\frac{1}{\log_e\left(e^{(2\pi)/5}\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\right)}$$

- $$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}=-\frac{1}{\log(a)\log_a\left(e^{(2\pi)/5}\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\right)}$$

- $$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}=\frac{-1}{-\text{Li}_1\left(1-e^{(2\pi)/5}\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\right)}$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}=\frac{1}{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-\frac{1}{2}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)^k}{k}}$$

- $$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}=\frac{1}{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)^k}{k}}$$

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$$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}=$$

$$-\frac{1}{2 i \pi \left\lfloor \frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi} \right\rfloor + \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}-z_0\right)^k z_0^{-k}}{k}}$$

arg(z) is the complex argument

⌊x⌋ is the floor function

Integral representation:

$$-\frac{1}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}=-\frac{1}{\int_1^{-\frac{1}{2}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}} \frac{1}{t}\,dt}$$

[-2/ ln(((((((([((((sqrt(((((5+sqrt(5))/2)))))))) – ((((((1+sqrt(5)))/2)))))))))] e^(2Pi/5)))))))))]^1/14

Input:

$$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{2\times\pi/5}\right)}}$$

log(x) is the natural logarithm

Exact result:

$$\sqrt[14]{-\frac{2}{\log\left(\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}}$$

Decimal approximation:

1.6460465043783971283620389091147662276868239757701406 22895...

1.6460465… ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

Alternate forms:

$$\sqrt[14]{-\frac{2}{\frac{2\pi}{5}+\log\left(\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)\right)}}$$

- $$\sqrt[14]{-\frac{2}{\log\left(\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}}$$

- $$\frac{\sqrt[14]{-2}}{\sqrt[14]{\frac{2\pi}{5}+\log\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)}}$$

All 14th roots of -2/log((1/2 (-1 - sqrt(5)) + sqrt(1/2 (5 + sqrt(5)))) e^((2 π)/5)):
Polar form

$$e^{0}\sqrt[14]{-\frac{2}{\log\left(\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}}\approx 1.6$$ (real, principal root)

- $$e^{(i\pi)/7}\sqrt[14]{-\frac{2}{\log\left(\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}}\approx 1.5+0.71\,i$$

- $$e^{(2i\pi)/7}\sqrt[14]{-\frac{2}{\log\left(\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}}\approx 1.03+1.3\,i$$

- $$e^{(3i\pi)/7}\sqrt[14]{-\frac{2}{\log\left(\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}}\approx 0.37+1.6\,i$$

- $$e^{(4i\pi)/7}\sqrt[14]{-\frac{2}{\log\left(\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)}}\approx -0.37+1.6\,i$$

Alternative representations:

$$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}} = \sqrt[14]{-\frac{2}{\log_e\left(e^{(2\pi)/5}\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\right)}}$$

- $$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}} = \sqrt[14]{-\frac{2}{\log(a)\log_a\left(e^{(2\pi)/5}\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\right)}}$$

- $$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}} = \sqrt[14]{\frac{-2}{-\text{Li}_1\left(1-e^{(2\pi)/5}\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\right)}}$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}} = \sqrt[14]{2}\ \sqrt[14]{\frac{1}{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-\frac{1}{2}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)^k}{k}}}$$

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$$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}} = \frac{\sqrt[14]{2}}{\sqrt[14]{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}\right)^k}{k}}}$$

- $$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}} = \sqrt[14]{2}\left(-\left(1\Big/\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}-z_0\right)^k z_0^{-k}}{k}\right)\right)\right)\text{^}(1/14)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representation:

$$\sqrt[14]{-\frac{2}{\log\left(\left(\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(1+\sqrt{5}\right)\right)e^{(2\pi)/5}\right)}} = \frac{\sqrt[14]{2}}{\sqrt[14]{-\int_1^{-\frac{1}{2}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)e^{(2\pi)/5}}\frac{1}{t}\,dt}}$$

From:

Anomaly Inflow and the η-Invariant

Edward Witten and Kazuya Yonekura
School of Natural Sciences, Institute for Advanced Study
Einstein Drive, Princeton, NJ 08540 USA
Department of Physics, Tohoku University, Sendai 980-8578, Japan

arXiv:1909.08775v1 [hep-th] 19 Sep 2019

When there is no perturbative anomaly, there may still be a global anomaly. As we discussed in section 3.1, the anomaly is governed by $\exp(-i\pi\eta_{\overline{Y}}/2)$ for closed $d+1$-manifolds $\overline{Y}$. This can definitely

be nontrivial even when there is no perturbative anomaly. However, from the APS index formula, we can reach an important conclusion about the function $\exp(-i\pi\eta_{\overline{Y}}/2)$ when $\Phi_{d+2}=0$. Suppose that $\overline{Y}$ is the boundary of a $d+2$-manifold X over which the relevant structures extend. The index formula then reduces to $\eta_{\overline{Y}}=-2\mathcal{I}$. Since $\mathcal{I}$ is an even integer, $\eta_{\overline{Y}}$ is an integer multiple of 4, and therefore in this situation $\exp(-i\pi\eta_{\overline{Y}}/2)=1$. In other words, we have learned that when there is no perturbative anomaly, the function $\exp(-i\pi\eta_{\overline{Y}}/2)$ that governs the global anomaly is a cobordism invariant: it is trivial on any $\overline{Y}$ that is the boundary of some X. It may be a nontrivial cobordism invariant; if $\overline{Y}$ is not the boundary of any X, it may happen that $\exp(-i\pi\eta_{\overline{Y}}/2)\neq 1$. This is precisely the case that the original theory of the χ field in dimension d has a nontrivial global anomaly.

all symmetries and with the Dirac operator $\mathcal{D}_{\overline{Y}}$. After another round of doubling, the Dirac operator $\mathcal{D}_X$ on X has an antilinear symmetry $\overline{\mathsf{C}}$ that also obeys $\overline{\mathsf{C}}^2=-1$. The definition of Γ^τ was chosen to make the definition simple:

$$\overline{\mathsf{C}}=\begin{pmatrix}\mathsf{C} & 0\\ 0 & \mathsf{C}\end{pmatrix}. \tag{3.8}$$

Given that C anticommutes with the γ^μ, $\overline{\mathsf{C}}$ anticommutes with Γ^μ and Γ^τ, and hence commutes with $\mathcal{D}_X=i(\Gamma^\mu D_\mu+\Gamma^\tau D_\tau)$.

The existence of an antilinear transformation $\overline{\mathsf{C}}$ that commutes with $\mathcal{D}_X$ and squares to -1 implies that all eigenvalues of $\mathcal{D}_X$ have even multiplicity, by a kind of Kramers doubling of eigenvalues. In particular, the index $\mathcal{I}$ of $\mathcal{D}_X$ is even. We will see shortly why this is important.

Now let us look at the APS index formula for $\mathcal{I}$:

$$\mathcal{I}=\int_X \Phi_{d+2}-\frac{\eta_{\overline{Y}}}{2}. \tag{3.9}$$

For this to be the case, Q_Y must be the integral over Y of some local operator Φ: $Q_Y = \int_Y \Phi$. Φ must be such that Q_Y respects all symmetries of the theory, including possible time-reversal or reflection symmetries. Eqn. (3.10) tells us that in the case of a closed manifold $\overline{Y}$,

$$\exp(-\mathrm{i}\pi\eta_{\overline{Y}}/2) = \exp\left(-\mathrm{i}\int_{\overline{Y}} \Phi\right), \tag{3.11}$$

$Z_W \exp(\mathrm{i}\int_Y \mathrm{d}\Lambda) = Z_W \exp(\mathrm{i}\int_W \Lambda)$. This is equivalent to adding to the action of the original theory on W a c-number term $-\mathrm{i}\int_W \Lambda$ constructed from the background fields. That does not affect the consistency of the theory, so an exact term in Φ is not important. So in short, the case that Φ can help in eliminating an anomaly is that Φ is a polynomial in R and F. Φ is supposed to be a D-form, so this is only possible if D is even. For such a Φ, $\int_{\overline{Y}} \Phi$ is a characteristic class.

Whenever $\Upsilon_{\overline{Y}} = \exp(-\mathrm{i}\pi\eta_{\overline{Y}}/2)$ can be expressed as in eqn. (3.11) in terms of a characteristic class $\int_{\overline{Y}} \Phi$, we can define a purely d-dimensional partition function for the field χ. Under these assumptions,

$$Z_W = |\mathrm{Pf}\, \mathcal{D}_W^+| \exp(-\mathrm{i}\pi\eta_Y/2) \exp\left(\mathrm{i}\int_Y \Phi\right) \tag{3.12}$$

depends only on W and not on Y.[25]

The eq. (3.12), for:

$\exp(-\mathrm{i}\pi\eta_{\overline{Y}}/2) = 1$

We write $\mathcal{D}_W^+ = -\sigma^\mu D_\mu$

set $\sigma^0 = 1$, $\overline{\sigma}^0 = -(\sigma^0)^{-1}$

$\mathcal{D}_W^+ = -\sigma^\mu D_\mu$

$D = 10$

determinant of {{1, 0}, {0, 1}} = 1

$$\exp(-\mathrm{i}\pi\eta_{\overline{Y}}/2) = \exp\left(-\mathrm{i}\int_{\overline{Y}} \Phi\right),$$

$$Z_W = |\mathrm{Pf}\, \mathcal{D}_W^+| \exp(-\mathrm{i}\pi\eta_Y/2) \exp\left(\mathrm{i}\int_Y \Phi\right)$$

10 * exp(-1*-1)

Input:

$10 \exp(-(-1))$

Exact result:

$10 e$

Decimal approximation:

- More digits

27.18281828459045235360287471352662497757247093699959574966...

27.18281828459…

Property:

$10 e$ is a transcendental number

Series representations:

$$10 \exp(-(-1)) = 10 \sum_{k=0}^{\infty} \frac{1}{k!}$$

-

$$10 \exp(-(-1)) = 5 \sum_{k=0}^{\infty} \frac{1+k}{k!}$$

-

$$10 \exp(-(-1)) = \frac{10 \sum_{k=0}^{\infty} \frac{-1+k+z}{k!}}{z}$$

$n!$ is the factorial function

More information »

(((10 * exp(-1*-1))))^1/7

Input:

$\sqrt[7]{10 \exp(-(-1))}$

Exact result:

$\sqrt[7]{10 e}$

Decimal approximation:

1.602873362873323742550018277986514154903547769404712172196...

1.602873362… result very near to the elementary charge

Property:

$\sqrt[7]{10 e}$ is a transcendental number

-

All 7th roots of 10 e:

$\sqrt[7]{10 e}\ e^0 \approx 1.60287$ (real, principal root)

- $\sqrt[7]{10 e}\ e^{(2 i \pi)/7} \approx 0.9994 + 1.2532 i$

- $\sqrt[7]{10 e}\ e^{(4 i \pi)/7} \approx -0.3567 + 1.56269 i$

- $\sqrt[7]{10 e}\ e^{(6 i \pi)/7} \approx -1.4441 + 0.6955 i$

- $\sqrt[7]{10 e}\ e^{-(6 i \pi)/7} \approx -1.4441 - 0.6955 i$

Series representations:

$$\sqrt[7]{10 \exp(-(-1))} = \sqrt[7]{10} \sqrt[7]{\sum_{k=0}^{\infty} \frac{1}{k!}}$$

- $$\sqrt[7]{10 \exp(-(-1))} = \sqrt[7]{5} \sqrt[7]{\sum_{k=0}^{\infty} \frac{1+k}{k!}}$$

- $$\sqrt[7]{10 \exp(-(-1))} = \sqrt[7]{10} \sqrt[7]{\sum_{k=0}^{\infty} \frac{(-1+k)^2}{k!}}$$

$n!$ is the factorial function

Integral representation:

$$(1+z)^a = \frac{\int_{-i \infty+\gamma}^{i \infty+\gamma} \frac{\Gamma(s)\Gamma(-a-s)}{z^s} \, ds}{(2 \pi i)\Gamma(-a)} \quad \text{for } (0 < \gamma < -\text{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\text{Re}(z)$ is the real part of z

$\arg(z)$ is the complex argument

$|z|$ is the absolute value of z

i is the imaginary unit

(((10 * exp(-1*-1))))^2 – 10

Input:

$(10 \exp(-(-1)))^2 - 10$

Exact result:

$100 e^2 - 10$

Decimal approximation:

728.9056098930650227230427460575007813180315570551847324087...

728.905609… result is practically equal to the Ramanujan number 729

Property:

$-10 + 100 e^2$ is a transcendental number

•

Alternate form:

$10(10 e^2 - 1)$

Series representations:

$$(10 \exp(-(-1)))^2 - 10 = -10 + 100 \sum_{k=0}^{\infty} \frac{2^k}{k!}$$

•

$$(10 \exp(-(-1)))^2 - 10 = -10 + 100 \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^2$$

•

$$(10 \exp(-(-1)))^2 - 10 = -10 + 25 \left(\sum_{k=0}^{\infty} \frac{1+k}{k!}\right)^2$$

$n!$ is the factorial function

55+(((10 * exp(-1*-1))))^2 – 10

Input:

$55 + (10 \exp(-(-1)))^2 - 10$

Exact result:

$45 + 100 e^2$

Decimal approximation:

783.9056098930650227230427460575007813180315570551847324087...

783.905609… result very near to the rest mass of Omega meson 782.65

Property:

$45 + 100 e^2$ is a transcendental number

-

Alternate form:

$5 (9 + 20 e^2)$

Series representations:

$$55 + (10 \exp(-(-1)))^2 - 10 = 45 + 100 \sum_{k=0}^{\infty} \frac{2^k}{k!}$$

-

$$55 + (10 \exp(-(-1)))^2 - 10 = 45 + 100 \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^2$$

-

$$55 + (10 \exp(-(-1)))^2 - 10 = 45 + 25 \left(\sum_{k=0}^{\infty} \frac{1+k}{k!}\right)^2$$

10^3+(((55+(((10 * exp(-1*-1))))^2 - 10)))

Input:

$10^3 + (55 + (10 \exp(-(-1)))^2 - 10)$

Exact result:

$1045 + 100 e^2$

Decimal approximation:

1783.905609893065022723042746057500781318031557055184732408...

1783.905609… result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Property:

$1045 + 100 e^2$ is a transcendental number

-

Alternate form:

$5 (209 + 20 e^2)$

Series representations:

$$10^3 + (55 + (10 \exp(-(-1)))^2 - 10) = 1045 + 100 \sum_{k=0}^{\infty} \frac{2^k}{k!}$$

- $$10^3 + (55 + (10 \exp(-(-1)))^2 - 10) = 1045 + 100 \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^2$$

- $$10^3 + (55 + (10 \exp(-(-1)))^2 - 10) = 1045 + 25 \left(\sum_{k=0}^{\infty} \frac{1+k}{k!}\right)^2$$

$n!$ is the factorial function

For the following formula, concerning the '7th order' mock theta function where a(n) is the number of partitions of n

a(n) ~ exp(Pi*sqrt(2*n/21)) / (2^(3/2) * sin(2*Pi/7) * sqrt(7*n)),

we obtain, for n = 50:

exp(Pi*sqrt(2*50/21)) / (2^(3/2) * sin(2*Pi/7) * sqrt(7*50))

Input:

$$\frac{\exp\left(\pi \sqrt{2 \times \frac{50}{21}}\right)}{2^{3/2} \sin\left(2 \times \frac{\pi}{7}\right) \sqrt{7 \times 50}}$$

Exact result:

$$\frac{e^{(10 \pi)/\sqrt{21}} \sec\left(\frac{3 \pi}{14}\right)}{20 \sqrt{7}}$$

$\sec(x)$ is the secant function

Decimal approximation:

22.94146375436966398488222710622342293449805159484776611274...

22.941463… a(n)

Result very near to the black hole entropy 22.6589

Property:

$$\frac{e^{(10 \pi)/\sqrt{21}} \sec\left(\frac{3 \pi}{14}\right)}{20 \sqrt{7}}$$ is a transcendental number

-

Alternate forms:

$e^{(10\pi)/\sqrt{21}}$ root of $49000x^3 - 70x + 1$ near $x = 0.0241717$

-

$$\frac{e^{(10\pi)/\sqrt{21}}\cos\left(\frac{3\pi}{14}\right)}{10\sqrt{7}\left(1+\sin\left(\frac{\pi}{14}\right)\right)}$$

-

$$\frac{e^{(10\pi)/\sqrt{21}}}{10\sqrt{7}\left(e^{-(3i\pi)/14}+e^{(3i\pi)/14}\right)}$$

Alternative representations:

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = \frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\cos\left(\frac{\pi}{2}-\frac{2\pi}{7}\right)2^{3/2}\sqrt{350}}$$

-

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -\frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\cos\left(\frac{\pi}{2}+\frac{2\pi}{7}\right)2^{3/2}\sqrt{350}}$$

-

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = \frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\frac{2^{3/2}\left(-e^{-(2i\pi)/7}+e^{(2i\pi)/7}\right)\sqrt{350}}{2i}}$$

i is the imaginary unit

Series representations:

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -\frac{e^{(10\pi)/\sqrt{21}}\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}}{10\sqrt{7}} \quad \text{for } q = (-1)^{3/14}$$

-

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = \frac{7\sqrt{7}\,e^{(10\pi)/\sqrt{21}}\sum_{k=0}^{\infty}\frac{(-1)^k(1+2k)}{10+49k+49k^2}}{20\pi}$$

-

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = \frac{e^{(10\pi)/\sqrt{21}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{3\pi}{14}\right)^{2k}E_{2k}}{(2k)!}}{20\sqrt{7}}$$

E_n is the n^{th} Euler number

$n!$ is the factorial function

regularizing the result by 2e-1, we obtain:

(2*e-1) + (((((exp(Pi*sqrt(2*50/21)) / (2^(3/2) * sin(2*Pi/7) * sqrt(7*50)))))))

Input:

$$(2e-1)+\frac{\exp\left(\pi\sqrt{2\times\frac{50}{21}}\right)}{2^{3/2}\sin\left(2\times\frac{\pi}{7}\right)\sqrt{7\times 50}}$$

Exact result:

$$-1+2e+\frac{e^{(10\pi)/\sqrt{21}}\sec\left(\frac{3\pi}{14}\right)}{20\sqrt{7}}$$

$\sec(x)$ is the secant function

Decimal approximation:

27.378027411287754455602802048928747930012545782247685262 67...

27.378… a(n)

Alternate forms:

- More

$$\frac{1}{140}\left(-140+280e+\sqrt{7}\,e^{(10\pi)/\sqrt{21}}\sec\left(\frac{3\pi}{14}\right)\right)$$

- $e^{(10\pi)/\sqrt{21}}$ (root of $49000x^3-70x+1$ near $x=0.0241717$) $-1+2e$

- $$-1+2e+\frac{e^{(10\pi)/\sqrt{21}}\cos\left(\frac{3\pi}{14}\right)}{10\sqrt{7}\left(1+\sin\left(\frac{\pi}{14}\right)\right)}$$

Alternative representations:

$$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\cos\left(\frac{\pi}{2}-\frac{2\pi}{7}\right)2^{3/2}\sqrt{350}}$$

- $$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+-\frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\cos\left(\frac{\pi}{2}+\frac{2\pi}{7}\right)2^{3/2}\sqrt{350}}$$

- $$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\frac{2^{3/2}\left(-e^{-(2i\pi)/7}+e^{(2i\pi)/7}\right)\sqrt{350}}{2i}}$$

i is the imaginary unit

Series representations:

$$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e-\frac{e^{(10\pi)/\sqrt{21}}\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}}{10\sqrt{7}}$$

for $q = (-1)^{3/14}$

- $$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{7\sqrt{7}\,e^{(10\pi)/\sqrt{21}}\sum_{k=0}^{\infty}\frac{(-1)^k(1+2k)}{10+49k+49k^2}}{20\pi}$$

- $$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{e^{(10\pi)/\sqrt{21}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{3\pi}{14}\right)^{2k}E_{2k}}{(2k)!}}{20\sqrt{7}}$$

E_n is the n^{th} Euler number

$n!$ is the factorial function

Integral representation:

$$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{e^{(10\pi)/\sqrt{21}}}{10\sqrt{7}\,\pi}\int_0^{\infty}\frac{t^{3/7}}{1+t^2}\,dt$$

Multiple-argument formulas:

$$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{e^{(10\pi)/\sqrt{21}}\sec^2\left(\frac{3\pi}{28}\right)}{20\sqrt{7}\left(2-\sec^2\left(\frac{3\pi}{28}\right)\right)}$$

-

$$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{e^{(10\pi)/\sqrt{21}}\sec^3\left(\frac{\pi}{14}\right)}{\sqrt{7}\left(80-60\sec^2\left(\frac{\pi}{14}\right)\right)}$$

-

$$(2e-1)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}} = -1+2e+\frac{e^{(10\pi)/\sqrt{21}}\sec^3\left(\frac{\pi}{14}\right)}{20\sqrt{7}\left(4-3\sec^2\left(\frac{\pi}{14}\right)\right)}$$

Note that, adding the value of the golden ratio, we obtain:

(1+sqrt(5))/2))+ (((((exp(Pi*sqrt(2*50/21)) / (2^(3/2) * sin(2*Pi/7) * sqrt(7*50)))))))

Input:

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{2\times\frac{50}{21}}\right)}{2^{3/2}\sin\left(2\times\frac{\pi}{7}\right)\sqrt{7\times 50}}$$

Exact result:

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{e^{(10\pi)/\sqrt{21}}\sec\left(\frac{3\pi}{14}\right)}{20\sqrt{7}}$$

$\sec(x)$ is the secant function

Decimal approximation:

24.559497743119558833086813940589061052218360774653528974 87...

24.5594977… result very near to the black hole entropy 24.4233

Property:

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{e^{(10\pi)/\sqrt{21}}\sec\left(\frac{3\pi}{14}\right)}{20\sqrt{7}}$$ is a transcendental number

-

Alternate forms:

$$\frac{1}{140}\left(70+70\sqrt{5}+\sqrt{7}\,e^{(10\pi)/\sqrt{21}}\sec\left(\frac{3\pi}{14}\right)\right)$$

- $$e^{(10\pi)/\sqrt{21}}\left(\text{root of } 49000x^3-70x+1 \text{ near } x=0.0241717\right)+\frac{1}{2}\left(1+\sqrt{5}\right)$$

- $$\frac{\left(e^{(10\pi)/\sqrt{21}}+10\sqrt{7}\left(1+\sqrt{5}\right)\cos\left(\frac{3\pi}{14}\right)\right)\sec\left(\frac{3\pi}{14}\right)}{20\sqrt{7}}$$

Alternative representations:

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times50}}=\frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\cos\left(\frac{\pi}{2}-\frac{2\pi}{7}\right)2^{3/2}\sqrt{350}}+\frac{1}{2}\left(1+\sqrt{5}\right)$$

- $$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times50}}=-\frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\cos\left(\frac{\pi}{2}+\frac{2\pi}{7}\right)2^{3/2}\sqrt{350}}+\frac{1}{2}\left(1+\sqrt{5}\right)$$

- $$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times50}}=\frac{\exp\left(\pi\sqrt{\frac{100}{21}}\right)}{\frac{2^{3/2}\left(-e^{-(2i\pi)/7}+e^{(2i\pi)/7}\right)\sqrt{350}}{2i}}+\frac{1}{2}\left(1+\sqrt{5}\right)$$

i is the imaginary unit

Series representations:

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times50}}=\frac{1}{2}+\frac{\sqrt{5}}{2}-\frac{e^{(10\pi)/\sqrt{21}}\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}}{10\sqrt{7}}$$

for $q=(-1)^{3/14}$

- $$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times50}}=\frac{1}{2}+\frac{\sqrt{5}}{2}+\frac{7\sqrt{7}\,e^{(10\pi)/\sqrt{21}}\sum_{k=0}^{\infty}\frac{(-1)^k(1+2k)}{10+49k+49k^2}}{20\pi}$$

-

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}}=\frac{1}{2}+\frac{\sqrt{5}}{2}+\frac{e^{(10\pi)/\sqrt{21}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{3\pi}{14}\right)^{2k}E_{2k}}{(2k)!}}{20\sqrt{7}}$$

E_n is the n^{th} Euler number

$n!$ is the factorial function

Integral representation:

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}}=\frac{1}{2}+\frac{\sqrt{5}}{2}+\frac{e^{(10\pi)/\sqrt{21}}}{10\sqrt{7}\,\pi}\int_0^{\infty}\frac{t^{3/7}}{1+t^2}\,dt$$

Multiple-argument formulas:

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}}=\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{e^{(10\pi)/\sqrt{21}}\sec^2\left(\frac{3\pi}{28}\right)}{20\sqrt{7}\left(2-\sec^2\left(\frac{3\pi}{28}\right)\right)}$$

-

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{\exp\left(\pi\sqrt{\frac{2\times 50}{21}}\right)}{2^{3/2}\sin\left(\frac{2\pi}{7}\right)\sqrt{7\times 50}}=\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{e^{(10\pi)/\sqrt{21}}\sec^3\left(\frac{\pi}{14}\right)}{20\sqrt{7}\left(4-3\sec^2\left(\frac{\pi}{14}\right)\right)}$$

For

$\exp(-i\pi\eta_{\overline{Y}}/2)=\pm 1$ for a closed manifold $\overline{Y}$,

And:

$$\exp(-i\pi\eta_{\overline{Y}}/2)=\exp\left(-i\int_{\overline{Y}}\Phi\right),$$

$$Z_W=|\mathrm{Det}\,\mathcal{D}_W^+|\exp(-i\pi\eta_{D,Y})\exp\left(-i\pi\int_Y\Phi\right)$$

10 * exp(-1/2*-Pi)

Input:

$$10\exp\left(-\frac{1}{2}\times(-1)\pi\right)$$

Exact result:

$10\,e^{\pi/2}$

Decimal approximation:

48.104773809653516554730356670383312639017087466453494002...

48.104773…

Property:

$10\,e^{\pi/2}$ is a transcendental number

Series representations:

$$10\exp\left(\frac{1}{2}(-\pi)(-1)\right)=10\,e^{2\sum_{k=0}^{\infty}(-1)^k/(1+2k)}$$

- $$10\exp\left(\frac{1}{2}(-\pi)(-1)\right)=10\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi/2}$$

- $$10\exp\left(\frac{1}{2}(-\pi)(-1)\right)=10\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi/2}$$

$n!$ is the factorial function

Integral representations:

$$10\exp\left(\frac{1}{2}(-\pi)(-1)\right)=10\,e^{\int_0^1 1/\sqrt{1-t^2}\,dt}$$

- $$10\exp\left(\frac{1}{2}(-\pi)(-1)\right)=10\,e^{2\int_0^1\sqrt{1-t^2}\,dt}$$

- $$10\exp\left(\frac{1}{2}(-\pi)(-1)\right)=10\,e^{\int_0^\infty 1/(1+t^2)\,dt}$$

For the formula of Coefficients of the '7th order' mock theta function $F_0(q)$, for n = 57 or 58, that we have regularized as: $57 + (\sqrt{5} - 1)/2 = 57.61803398...$, we obtain:

sin(Pi/7) * exp(Pi*sqrt(2*(57+(((sqrt(5)-1)/2)))/21)) / sqrt(7*(57+(((sqrt(5)-1)/2)))/2)

Input:

$$\sin\left(\frac{\pi}{7}\right)\times\frac{\exp\left(\pi\sqrt{2\left(\frac{1}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)}\right)}{\sqrt{7\left(\frac{1}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)}}$$

Exact result:

$$\sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}\, e^{\sqrt{2/21\left(57+1/2\left(\sqrt{5}-1\right)\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)$$

Decimal approximation:

47.989730203088967397040979133177761622691309808059320936 16...

47.98973…

Property:

$$\sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}\, e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)$$ is a transcendental number

Alternate forms:

- $$\frac{2\, e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$
- $$-\frac{(-1)^{5/14}\left(\sqrt[7]{-1}-1\right)\left(1+\sqrt[7]{-1}\right)e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$
- $$\frac{i\, e^{\sqrt{2/21\left(57+1/2\left(\sqrt{5}-1\right)\right)}\,\pi}\left(e^{-(i\pi)/7}-e^{(i\pi)/7}\right)}{\sqrt{14\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}$$

Alternative representations:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{\cos\left(\frac{\pi}{2}-\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = -\frac{\cos\left(\frac{\pi}{2}+\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)\left(-e^{-(i\pi)/7}+e^{(i\pi)/7}\right)}{(2i)\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

i is the imaginary unit

Series representations:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{2e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sum_{k=0}^{\infty}\frac{(-1)^k\,7^{-1-2k}\,\pi^{1+2k}}{(1+2k)!}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{2e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sum_{k=0}^{\infty}\frac{(-1)^{3k}\left(\frac{5\pi}{14}\right)^{2k}}{(2k)!}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{4e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{\pi}{7}\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{2e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\pi}\pi}{7\sqrt{7\left(113+\sqrt{5}\right)}}\int_0^1\cos\left(\frac{\pi t}{7}\right)dt$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} =$$
$$-\frac{1}{14}\,i\,e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\pi}\sqrt{\frac{\pi}{791+7\sqrt{5}}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-\pi^2/(196s)+s}}{s^{3/2}}\,ds \quad \text{for } \gamma>0$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} =$$
$$-\frac{i\,e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\pi}}{\sqrt{7\left(113+\sqrt{5}\right)\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(\frac{\pi}{14}\right)^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds \quad \text{for } 0<\gamma<1$$

$\Gamma(x)$ is the gamma function

Multiple-argument formulas:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = -\frac{(-1)^{5/14}\left(-1+(-1)^{2/7}\right)e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\pi}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{2e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\pi}\sin\left(\frac{\pi}{7}\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = -\frac{2\,e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sin\left(\frac{\pi}{21}\right)\left(-3+4\sin^2\left(\frac{\pi}{21}\right)\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = -\frac{2\,e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sin\left(\frac{\pi}{21}\right)\left(-3\cos^2\left(\frac{\pi}{21}\right)+\sin^2\left(\frac{\pi}{21}\right)\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

We have also the following results:

10*(((10 * exp(-1/2*-Pi))))+16

Input:

$$10\left(10\exp\left(-\frac{1}{2}\times(-1)\,\pi\right)\right)+16$$

Exact result:

$$16+100\,e^{\pi/2}$$

Decimal approximation:

497.0477380965351655473035666703833126390170874664534940020...

497.04773809… result very near to the rest mass of Kaon meson 497.614

Property:

$16+100\,e^{\pi/2}$ is a transcendental number

- **Alternate form:**

$$4\left(4+25\,e^{\pi/2}\right)$$

Series representations:

$$10\times 10\exp\left(-\frac{1}{2}(-1)\,\pi\right)+16 = 16+100\,e^{2\sum_{k=0}^{\infty}(-1)^k/(1+2k)}$$

-

$$10 \times 10 \exp\left(-\frac{1}{2}(-1)\pi\right) + 16 = 16 + 100 \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{\pi/2}$$

- $$10 \times 10 \exp\left(-\frac{1}{2}(-1)\pi\right) + 16 = 16 + 100 \left(\frac{1}{\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}}\right)^{\pi/2}$$

$n!$ is the factorial function

Integral representations:

$$10 \times 10 \exp\left(-\frac{1}{2}(-1)\pi\right) + 16 = 16 + 100\, e^{\int_0^1 1/\sqrt{1-t^2}\, dt}$$

- $$10 \times 10 \exp\left(-\frac{1}{2}(-1)\pi\right) + 16 = 16 + 100\, e^{2 \int_0^1 \sqrt{1-t^2}\, dt}$$

- $$10 \times 10 \exp\left(-\frac{1}{2}(-1)\pi\right) + 16 = 16 + 100\, e^{\int_0^\infty 1/(1+t^2)\, dt}$$

10*(((10 * exp(-1/2*-Pi))))+16-1.0061571663

Input interpretation:

$$10\left(10 \exp\left(-\frac{1}{2} \times (-1)\pi\right)\right) + 16 - 1.0061571663$$

Result:

496.04158093024...

496.0415809... result that is the number of dimensions of E_8 x E_8 (superstring theory)

Or, from the previous formula of the Coefficients of the '7th order' mock theta function $F_0(q)$ we obtain:

10*sin(Pi/7) * exp(Pi*sqrt(2*(57+(((sqrt(5)-1)/2)))/21)) / sqrt(7*(57+(((sqrt(5)-1)/2)))/2)+16

Input:

$$10 \sin\left(\frac{\pi}{7}\right) \times \frac{\exp\left(\pi \sqrt{2\left(\frac{1}{21}\left(57 + \frac{1}{2}\left(\sqrt{5} - 1\right)\right)\right)}\right)}{\sqrt{7\left(\frac{1}{2}\left(57 + \frac{1}{2}\left(\sqrt{5} - 1\right)\right)\right)}} + 16$$

Exact result:

$$16+10\sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}\; e^{\sqrt{2/21\left(57+1/2\left(\sqrt{5}-1\right)\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)$$

Decimal approximation:

495.8973020308896739704097913317776162269130980805932093616...

495.8973… ≈ 496 result that is the number of dimensions of E_8 x E_8 (superstring theory)

Property:

$$16+10\sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}\; e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)$$

is a transcendental number

Alternate forms:

$$16+\frac{20\, e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

- $$\frac{4}{7}\left(28+5\sqrt{\frac{7}{113+\sqrt{5}}}\; e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)\right)$$

- $$16+5\,i\sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}\; e^{\sqrt{2/21\left(57+1/2\left(\sqrt{5}-1\right)\right)}\,\pi}\left(e^{-(i\pi)/7}-e^{(i\pi)/7}\right)$$

Alternative representations:

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16=$$

$$16-\frac{10\cos\left(\frac{\pi}{2}+\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

-

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16 = 16+\frac{10\cos\left(\frac{\pi}{2}-\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16 = 16+\frac{10\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)\left(-e^{-(i\pi)/7}+e^{(i\pi)/7}\right)}{(2i)\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

i is the imaginary unit

Series representations:

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16 = 16+\frac{20\,e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sum_{k=0}^{\infty}\frac{(-1)^k\,7^{-1-2k}\,\pi^{1+2k}}{(1+2k)!}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

•

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16=$$

$$16+\frac{20\,e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sum_{k=0}^{\infty}\frac{(-1)^{3k}\left(\frac{5\pi}{14}\right)^{2k}}{(2k)!}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

-

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16=$$

$$16+10\sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}\;e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi}\sum_{k=0}^{\infty}\frac{(-1)^k\,7^{-1-2k}\,\pi^{1+2k}}{(1+2k)!}$$

$n!$ is the factorial function

Integral representations:

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16=$$

$$16+\frac{10}{7}\sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}\;e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi}\,\pi\int_0^1\cos\left(\frac{\pi t}{7}\right)dt$$

-

$$\frac{\left(10\sin\left(\frac{\pi}{7}\right)\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}+16=$$

$$16-\frac{5}{7}\,i\,e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi}\sqrt{\frac{\pi}{14\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-\pi^2/(196s)+s}}{s^{3/2}}\,ds$$

for $\gamma>0$

-

$$\frac{\left(10 \sin\left(\frac{\pi}{7}\right)\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} + 16 =$$

$$16 - 5 i e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi} \sqrt{\frac{2}{7\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\left(\frac{\pi}{14}\right)^{1-2s} \Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)} \, ds$$

for $0 < \gamma < 1$

$\Gamma(x)$ is the gamma function

From:

In detail, let $\overline{Y}$ be a closed three-manifold with spin structures α, β. The global anomaly is then measured by $\exp\left(-\frac{\pi i}{2} 8(\eta_{\overline{Y},\alpha} - \eta_{\overline{Y},\beta})\right)$ where $\eta_{\overline{Y},\alpha}$ and $\eta_{\overline{Y},\beta}$ are η-invariants on $\overline{Y}$ for a Majorana fermion coupled to spin structure α or β. We note that this is trivial if and only if one always has

$$\exp\left(-\frac{\pi i}{2} 8\eta_{\overline{Y},\alpha}\right) = \exp\left(-\frac{\pi i}{2} 8\eta_{\overline{Y},\beta}\right), \tag{4.16}$$

or in other words if and only if the anomaly for 8 positive chirality fermions in two dimensions does not depend on the spin structure. This is how we formulated the question initially.

and:

$\exp(-i\pi\eta_{\overline{Y}}/2) = \pm 1$ for a closed manifold $\overline{Y}$,

$\exp\left(-i\pi\eta_{Y}/2\right) = (-1)^{\varsigma}$

$(-1)^{\varsigma} = -1.$

exp(-(-8))

Input:

e^8

Decimal approximation:

2980.957987041728274743592099452888673755967939132835702208...

2980.9579… result practically equal to the rest mass of Charged eta meson 2980.3

Property:

e^8 is a transcendental number

Series representations:

$$e^8 = \sum_{k=0}^{\infty} \frac{8^k}{k!}$$

- $$e^8 = \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^8$$

- $$e^8 = \frac{1}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}\right)^8}$$

$n!$ is the factorial function

Integral representation:

$$(1+z)^a = \frac{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\,\pi\,i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\text{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\text{Re}(z)$ is the real part of z

$\arg(z)$ is the complex argument

$|z|$ is the absolute value of z

i is the imaginary unit

(((exp(-(-8)))))^1/16

Input:

$$\sqrt[16]{\exp(-(-8))}$$

Exact result:

$$\sqrt{e}$$

Decimal approximation:

1.6487212707001281468486507878141635716537761007101480115750...

$1.64872127\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Property:

$\sqrt{e}$ is a transcendental number

All 16th roots of e^8:

$\sqrt{e}\ e^0 \approx 1.64872$ (real, principal root)

- $\sqrt{e}\ e^{(i\pi)/8} \approx 1.5232 + 0.6309\, i$
- $\sqrt{e}\ e^{(i\pi)/4} \approx 1.1658 + 1.1658\, i$
- $\sqrt{e}\ e^{(3 i\pi)/8} \approx 0.6309 + 1.5232\, i$
- $\sqrt{e}\ e^{(i\pi)/2} \approx 1.64872\, i$

Series representations:

$$\sqrt[16]{\exp(-(-8))} = \sqrt{\sum_{k=0}^{\infty} \frac{1}{k!}}$$

- $$\sqrt[16]{\exp(-(-8))} = \sqrt{\sum_{k=0}^{\infty} \frac{(-1+k)^2}{k!}}$$
- $$\sqrt[16]{\exp(-(-8))} = \frac{\sqrt{\sum_{k=0}^{\infty} \frac{1+k}{k!}}}{\sqrt{2}}$$

$n!$ is the factorial function

Integral representation:

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\Gamma(-a-s)}{z^s}\, ds}{(2\pi i)\Gamma(-a)} \quad \text{for } (0 < \gamma < -\text{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\text{Re}(z)$ is the real part of z

$\arg(z)$ is the complex argument

$|z|$ is the absolute value of z

i is the imaginary unit

Now, from:

Since this theory has no perturbative anomaly, Υ is a cobordism invariant and in particular it is a topological invariant. But any Spin(8) bundle on a three-manifold is topologically trivial (since $\pi_i(\mathrm{Spin}(8)) = 0$ for $i \leq 2$). So we can continuously deform to the case that the background Spin(8) gauge field is trivial, in which case trivially $\Upsilon = 1$. Thus the Spin(8) theory under consideration has no global anomaly, and for any background Spin(8) gauge field,

$$\exp\left(-\frac{\pi \mathrm{i}}{2}\eta_{\overline{Y},\alpha,S_+}\right) = \exp\left(-\frac{\pi \mathrm{i}}{2}\eta_{\overline{Y},\alpha,S_-}\right). \tag{4.17}$$

we obtain:

$$\exp\left(-\frac{\pi \mathrm{i}}{2}\eta_{\overline{Y},\alpha,S_-}\right)$$

$\exp(-\mathrm{i}\pi\eta_{\overline{Y}}/2) = \pm 1$ for a closed manifold $\overline{Y}$,

exp(1)

Input:

exp(1)

Exact result:

e

Decimal approximation:

- More digits

2.7182818284590452353602874713526624977572470936999595749 66...

2.7182818…

Property:

e is a transcendental number

sqrt(((exp(1))))

Input:

$\sqrt{\exp(1)}$

Exact result:

$\sqrt{e}$

Decimal approximation:

1.6487212707001281468486507878141635716537761007101480115 75...

$1.64872127\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ \ldots$

Property:

$\sqrt{e}$ is a transcendental number

All 2nd roots of e:

$\sqrt{e}\ e^0 \approx 1.64872$ (real, principal root)

- $\sqrt{e}\ e^{i\pi} \approx -1.6487$ (real root)

Series representations:

$$\sqrt{\exp(1)} = \sqrt{\sum_{k=0}^{\infty} \frac{1}{k!}}$$

- $$\sqrt{\exp(1)} = \sqrt{\sum_{k=0}^{\infty} \frac{(-1+k)^2}{k!}}$$

- $$\sqrt{\exp(1)} = \frac{\sqrt{\sum_{k=0}^{\infty} \frac{1+k}{k!}}}{\sqrt{2}}$$

$n!$ is the factorial function

We have also that:

-3/10^2+sqrt(((exp(1))))

Input:

$$-\frac{3}{10^2} + \sqrt{\exp(1)}$$

Exact result:

$$\sqrt{e} - \frac{3}{100}$$

Decimal approximation:

- More digits

1.618721270700128146848650787814163571653776100710148011575...

1.61872127…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Property:

$-\frac{3}{100}+\sqrt{e}$ is a transcendental number

- **Alternate form:**

$\frac{1}{100}\left(100\sqrt{e}-3\right)$

Series representations:

$$-\frac{3}{10^2}+\sqrt{\exp(1)} = -\frac{3}{100}+\sqrt{-1+\exp(1)}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}(-1+\exp(1))^{-k}$$

- $$-\frac{3}{10^2}+\sqrt{\exp(1)} = -\frac{3}{100}+\sqrt{-1+\exp(1)}\sum_{k=0}^{\infty}\frac{(-1)^k(-1+\exp(1))^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

- $$-\frac{3}{10^2}+\sqrt{\exp(1)} = -\frac{3}{100}+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\exp(1)-z_0)^k z_0^{-k}}{k!}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

And:

(-8/10^3+3/10^2+1/10^3)+sqrt(((exp(1))))

Input:

$$\left(-\frac{8}{10^3}+\frac{3}{10^2}+\frac{1}{10^3}\right)+\sqrt{\exp(1)}$$

Exact result:

$$\frac{23}{1000}+\sqrt{e}$$

Decimal approximation:

1.671721270700128146848650787814163571653776100710148011575...

1.67172127…

We note that 1.67172127... is a result practically equal to the value of the formula:

$m_{p\prime} = 2 \times \frac{\eta}{R} m_P = 1.6714213 \times 10^{-24}$ gm

that is the holographic proton mass

Property:

$\frac{23}{1000}+\sqrt{e}$ is a transcendental number

Alternate form:

$$\frac{23+1000\sqrt{e}}{1000}$$

Series representations:

$$\left(-\frac{8}{10^3}+\frac{3}{10^2}+\frac{1}{10^3}\right)+\sqrt{\exp(1)} = \frac{23}{1000}+\sqrt{-1+\exp(1)}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}(-1+\exp(1))^{-k}$$

•

$$\left(-\frac{8}{10^3}+\frac{3}{10^2}+\frac{1}{10^3}\right)+\sqrt{\exp(1)} = \frac{23}{1000}+\sqrt{-1+\exp(1)}\sum_{k=0}^{\infty}\frac{(-1)^k(-1+\exp(1))^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

•

$$\left(-\frac{8}{10^3}+\frac{3}{10^2}+\frac{1}{10^3}\right)+\sqrt{\exp(1)} = \frac{23}{1000}+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\exp(1)-z_0)^k z_0^{-k}}{k!}$$

for not $((z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

Mathematical connections:

a) $\sqrt{\exp(1)} = 1.6487212707001281468486507878141635716537761007101480 11575...$

$1.64872127\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

b) $\sqrt{e}-\frac{3}{100} = 1.6187212707001281468486507878141635716537761007101480 11575...$

$1.61872127\ldots \approx 1.61803398\ldots = \phi$

c) $\frac{23}{1000}+\sqrt{e} = 1.6717212707001281468486507878141635716537761007101480 11575...$

$1.67172127\ldots \approx m_{p'} = 2\times\frac{\eta}{R}m_P = 1.6714213\times10^{-24}$ gm

Note that:

1/4((exp(-(-8))))-16-1.22734321771259

Where f(q) = 1.22734321771259 is a Ramanujan mock theta function

Input interpretation:

$\frac{1}{4}\exp(-(-8))-16-1.22734321771259$

Result:

728.012153542719479...

728.012153... result very near to the Ramanujan number 728 = 9^3-1

10^3+1/4((exp(-(-8))))-16

Input:

$$10^3 + \frac{1}{4}\exp(-(-8)) - 16$$

Exact result:

$$984 + \frac{e^8}{4}$$

Decimal approximation:

1729.2394967604320686858980248632221684389919847832089255552...

1729.239496…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Property:

$984 + \frac{e^8}{4}$ is a transcendental number

-

Alternate form:

$$\frac{1}{4}\left(3936 + e^8\right)$$

Series representations:

$$10^3 + \frac{1}{4}\exp(-(-8)) - 16 = 984 + \frac{1}{4}\sum_{k=0}^{\infty}\frac{8^k}{k!}$$

-

$$10^3 + \frac{1}{4}\exp(-(-8)) - 16 = 984 + \frac{1}{4}\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^8$$

-

$$10^3 + \frac{1}{4}\exp(-(-8)) - 16 = 984 + \frac{1}{4\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}\right)^8}$$

$n!$ is the factorial function

55+10^3+1/4((exp(-(-8))))-16

Input:

$$55 + 10^3 + \frac{1}{4}\exp(-(-8)) - 16$$

Exact result:

$$1039 + \frac{e^8}{4}$$

Decimal approximation:

1784.239496760432068685898024863222168438991984783208925552...

1784.239496... result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Property:

$1039 + \frac{e^8}{4}$ is a transcendental number

•

Alternate form:

$$\frac{1}{4}\left(4156 + e^8\right)$$

Series representations:

$$55 + 10^3 + \frac{1}{4}\exp(-(-8)) - 16 = 1039 + \frac{1}{4}\sum_{k=0}^{\infty} \frac{8^k}{k!}$$

•

$$55 + 10^3 + \frac{1}{4}\exp(-(-8)) - 16 = 1039 + \frac{1}{4}\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^8$$

•

$$55 + 10^3 + \frac{1}{4}\exp(-(-8)) - 16 = 1039 + \frac{1}{4\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}\right)^8}$$

$n!$ is the factorial function

From:

$$Z_W = |\mathrm{Det}\,\mathcal{D}_W^+|\exp(-\mathrm{i}\pi\eta_{D,Y})\exp\left(-\mathrm{i}\pi\int_Y \Phi\right)$$

We have also:

0.637*10 * exp(-1/2*-Pi)

Input:

$$0.637\times 10\exp\left(-\frac{1}{2}\times(-1)\pi\right)$$

Result:

30.6427...

30.6427... result very near to the black hole entropy 30.5963

For the formula of Coefficients of the '7th order' mock theta function $F_0(q)$, for n = 57 or 58, that we have regularized as: 57 + (√5 – 1)/2 = 57.61803398..., we obtain:

0.637*(((((sin(Pi/7) * exp(Pi*sqrt(2*(57+(((sqrt(5)-1)/2)))/21)) / sqrt(7*(57+(((sqrt(5)-1)/2)))/2))))))

Where 0.637 is a very closed approximation to the inverse of golden ratio (see paper **"Scaling Law for all Organized Matter"** – N. Haramein)

Input:

$$0.637\left(\sin\left(\frac{\pi}{7}\right)\times\frac{\exp\left(\pi\sqrt{2\left(\frac{1}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)}\right)}{\sqrt{7\left(\frac{1}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)}}\right)$$

Result:

30.569458139367672231915103707834234153654364347733787436 33...

30.56945… result practically equal to the black hole entropy 30.5963

Alternative representations:

$$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = -\frac{0.637 \cos\left(\frac{\pi}{2}+\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

- $$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{0.637 \cos\left(\frac{\pi}{2}-\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

- $$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{0.637 \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)\left(-e^{-(i\pi)/7}+e^{(i\pi)/7}\right)}{(2 i) \sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

i is the imaginary unit

Series representations:

$$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} =$$

$$\left(0.637 \exp\left(\pi \exp\left(i \pi \left\lfloor \frac{\arg\left(\frac{1}{21}\left(113-21 x+\sqrt{5}\right)\right)}{2 \pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{21}\right)^k x^{-k} \left(-\frac{1}{2}\right)_k \left(113-21 x+\sqrt{5}\right)^k}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k 7^{-1-2 k} \pi^{1+2 k}}{(1+2 k)!}\right) / \left(\exp\left(i \pi \left\lfloor \frac{\arg\left(\frac{791}{4}-x+\frac{7\sqrt{5}}{4}\right)}{2 \pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k x^{-k} \left(-\frac{1}{2}\right)_k \left(791-4 x+7 \sqrt{5}\right)^k}{k!}\right)$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} =$$

$$\left(1.274 \exp\left(\pi \exp\left(i \pi \left\lfloor \frac{\arg\left(\frac{1}{21}\left(113-21 x+\sqrt{5}\right)\right)}{2 \pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{21}\right)^k x^{-k} \left(-\frac{1}{2}\right)_k \left(113-21 x+\sqrt{5}\right)^k}{k!}\right) \sum_{k=0}^{\infty} (-1)^k J_{1+2 k}\left(\frac{\pi}{7}\right)\right) / \left(\exp\left(i \pi \left\lfloor \frac{\arg\left(\frac{791}{4}-x+\frac{7\sqrt{5}}{4}\right)}{2 \pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k x^{-k} \left(-\frac{1}{2}\right)_k \left(791-4 x+7 \sqrt{5}\right)^k}{k!}\right)$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} =$$

$$\left(0.637 \exp\left(\pi \left(\frac{1}{z_0}\right)^{1/2 \left\lfloor \arg\left(\frac{1}{21}\left(113+\sqrt{5}-21 z_0\right)\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor \arg\left(\frac{1}{21}\left(113+\sqrt{5}-21 z_0\right)\right)/(2\pi)\right\rfloor\right)} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{21}\right)^k \left(-\frac{1}{2}\right)_k \left(113+\sqrt{5}-21 z_0\right)^k z_0^{-k}}{k!}\right) \left(\frac{1}{z_0}\right)^{-1/2 \left\lfloor \arg\left(\frac{791}{4}+\frac{7\sqrt{5}}{4}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1/2-1/2 \left\lfloor \arg\left(\frac{791}{4}+\frac{7\sqrt{5}}{4}-z_0\right)/(2\pi)\right\rfloor} \sum_{k=0}^{\infty} \frac{(-1)^k\, 7^{-1-2k}\, \pi^{1+2k}}{(1+2k)!}\right) \Big/ \left(\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k \left(-\frac{1}{2}\right)_k \left(791+7\sqrt{5}-4 z_0\right)^k z_0^{-k}}{k!}\right)$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$J_n(z)$ is the Bessel function of the first kind

Integral representations:

$$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{0.091\, \pi \exp\left(\pi \sqrt{\frac{1}{21}\left(113+\sqrt{5}\right)}\right)}{\sqrt{\frac{7}{4}\left(113+\sqrt{5}\right)}} \int_0^1 \cos\left(\frac{\pi t}{7}\right) dt$$

•

$$\frac{0.637 \sin\left(\frac{\pi}{7}\right) \exp\left(\pi \sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{0.02275 \exp\left(\pi \sqrt{\frac{1}{21}\left(113+\sqrt{5}\right)}\right) \sqrt{\pi}}{i \sqrt{\frac{7}{4}\left(113+\sqrt{5}\right)}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-\pi^2/(196 s)+s}}{s^{3/2}}\, ds \quad \text{for } \gamma > 0$$

- $$\frac{0.637\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{0.3185\exp\left(\pi\sqrt{\frac{1}{21}\left(113+\sqrt{5}\right)}\right)\sqrt{\pi}}{i\pi\sqrt{\frac{7}{4}\left(113+\sqrt{5}\right)}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{14^{-1+2s}\pi^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds \quad \text{for } 0<\gamma<1$$

$\Gamma(x)$ is the gamma function

Multiple-argument formulas:

$$\frac{0.637\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = -\frac{2.548\exp\left(\pi\sqrt{\frac{2}{21}}\sqrt{\frac{1}{2}\left(113+\sqrt{5}\right)}\right)\left(-0.75\sin\left(\frac{\pi}{21}\right)+\sin^3\left(\frac{\pi}{21}\right)\right)}{\sqrt{\frac{7}{2}}\sqrt{\frac{1}{2}\left(113+\sqrt{5}\right)}}$$

- $$\frac{0.637\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{1.274\cos\left(\frac{\pi}{14}\right)\exp\left(\pi\sqrt{\frac{2}{21}}\sqrt{\frac{1}{2}\left(113+\sqrt{5}\right)}\right)\sin\left(\frac{\pi}{14}\right)}{\sqrt{\frac{7}{2}}\sqrt{\frac{1}{2}\left(113+\sqrt{5}\right)}}$$

- $$\frac{0.637\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}} = \frac{1.911\exp\left(\pi\sqrt{\frac{2}{21}}\sqrt{\frac{1}{2}\left(113+\sqrt{5}\right)}\right)\left(\cos^2\left(\frac{\pi}{21}\right)\sin\left(\frac{\pi}{21}\right)-0.333333\sin^3\left(\frac{\pi}{21}\right)\right)}{\sqrt{\frac{7}{2}}\sqrt{\frac{1}{2}\left(113+\sqrt{5}\right)}}$$

Or:

1/2(((((sin(Pi/7) * exp(Pi*sqrt(2*(57+(((sqrt(5)-1)/2)))/21)) / sqrt(7*(57+(((sqrt(5)-1)/2)))/2))))))

Input:

$$\frac{1}{2}\left(\sin\left(\frac{\pi}{7}\right)\times\frac{\exp\left(\pi\sqrt{2\left(\frac{1}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)}\right)}{\sqrt{7\left(\frac{1}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)}}\right)$$

Exact result:

$$\frac{e^{\sqrt{2/21\left(57+1/2\left(\sqrt{5}-1\right)\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)}{\sqrt{14\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}}$$

Decimal approximation:

23.994865101544483698520489566588880811345654904029660468 08...

23.9948651… result very near to the black hole entropy 23.9078

Property:

$$\frac{e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)}{\sqrt{14\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$ is a transcendental number

Alternate forms:

$$\frac{e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sin\left(\frac{\pi}{7}\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

-

$$-\frac{(-1)^{5/14}\left(\sqrt[7]{-1}-1\right)\left(1+\sqrt[7]{-1}\right)e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}}{2\sqrt{7\left(113+\sqrt{5}\right)}}$$

-

$$\frac{\sqrt{\frac{2}{7}\left(\frac{113}{2}+\frac{\sqrt{5}}{2}\right)}\ e^{\sqrt{2/21\left(57+1/2\left(\sqrt{5}-1\right)\right)}\ \pi}\ \sin\left(\frac{\pi}{7}\right)}{113+\sqrt{5}}$$

Alternative representations:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2}=\frac{\cos\left(\frac{\pi}{2}-\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{2\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2}=-\frac{\cos\left(\frac{\pi}{2}+\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)}{2\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2}=$$
$$\frac{\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}\right)\left(-e^{-(i\pi)/7}+e^{(i\pi)/7}\right)}{2\,(2\,i)\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

i is the imaginary unit

Series representations:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2}=\frac{e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\ \pi}\sum_{k=0}^{\infty}\frac{(-1)^k\,7^{-1-2k}\,\pi^{1+2k}}{(1+2k)!}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2}=\frac{e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\ \pi}\sum_{k=0}^{\infty}\frac{(-1)^{3k}\left(\frac{5\pi}{14}\right)^{2k}}{(2k)!}}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

-

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2} = \frac{2\, e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi} \sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{\pi}{7}\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2} = \frac{e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\,\pi}{7\sqrt{7\left(113+\sqrt{5}\right)}} \int_0^1 \cos\left(\frac{\pi t}{7}\right) dt$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2} = -\frac{1}{28}\, i\, e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi} \sqrt{\frac{\pi}{14\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-\pi^2/(196 s)+s}}{s^{3/2}}\, ds \quad \text{for } \gamma > 0$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\ 2} = -\frac{i\, e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}}{2\sqrt{7\left(113+\sqrt{5}\right)\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\left(\frac{\pi}{14}\right)^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\, ds \quad \text{for } 0 < \gamma < 1$$

$\Gamma(x)$ is the gamma function

Multiple-argument formulas:

$$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\,2} = -\frac{(-1)^{5/14}\left(-1+(-1)^{2/7}\right)e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}}{2\sqrt{7\left(113+\sqrt{5}\right)}}$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\,2} = -\frac{e^{\sqrt{1/21\left(113+\sqrt{5}\right)}\,\pi}\sin\left(\frac{\pi}{21}\right)\left(-3+4\sin^2\left(\frac{\pi}{21}\right)\right)}{\sqrt{7\left(113+\sqrt{5}\right)}}$$

- $$\frac{\sin\left(\frac{\pi}{7}\right)\exp\left(\pi\sqrt{\frac{2}{21}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\right)}{\sqrt{\frac{7}{2}\left(57+\frac{1}{2}\left(\sqrt{5}-1\right)\right)}\,2} = \frac{e^{\sqrt{2/21\left(57+1/2\left(-1+\sqrt{5}\right)\right)}\,\pi}\left(3\sin\left(\frac{\pi}{21}\right)-4\sin^3\left(\frac{\pi}{21}\right)\right)}{\sqrt{14\left(57+\frac{1}{2}\left(-1+\sqrt{5}\right)\right)}}$$

Inserting the value 23.99487 as entropy in the Hawking radiation calculator, supposing that the strings are black holes (see papers on Black Strings), we obtain:

Mass = 4.564181e-8

Radius = 6.777132e-35

Temperature = 2.688769e+30

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.564181e-8)* sqrt[[-((((2.688769e+30 * 4*Pi*(6.777132e-35)^3-(6.777132e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.564181\times 10^{-8}}\sqrt{-\frac{2.688769\times 10^{30}\times 4\pi\left(6.777132\times 10^{-35}\right)^3-\left(6.777132\times 10^{-35}\right)^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618249134682361526427068541209260400473472092569116672524...

1.61824913…

And:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.564181e-8)* sqrt[[-((((2.688769e+30 * 4*Pi*(6.777132e-35)^3-(6.777132e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.564181\times 10^{-8}}\sqrt{-\frac{2.688769\times 10^{30}\times 4\pi\,(6.777132\times 10^{-35})^3-(6.777132\times 10^{-35})^2}{6.67\times 10^{-11}}}\right)}\right)$$

Result:

0.617951821241841895525482027715480575453451204570433502734...

0.6179518…

From:

hep-th/9609122, IASSNS-HEP-96/96

ON FLUX QUANTIZATION IN M-THEORY AND THE EFFECTIVE ACTION

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For a more general eight-manifold, the formula for J, if written in terms of $\lambda = p_1/2$ and p_2, is

$$J = \frac{p_2 - \lambda^2}{48}. \qquad (3.1)$$

Now let us assess the integrality of J, using index theorems together with our previous considerations. The index of the Dirac operator on X, written in terms of λ and p_2, is

$$I = \frac{1}{1440}\left(7\lambda^2 - p_2\right). \qquad (3.2)$$

Since I is an integer, it follows that

$$p_2 - \lambda^2 \cong 6\lambda^2 \text{ modulo } 1440. \qquad (3.3)$$

Now, if G is to vanish, then according to our shifted flux condition, λ must be divisible by two, say $\lambda = 2x$ with x an integral class. So we can write

$$p_2 - \lambda^2 \cong 24x^2 \text{ modulo } 1440. \qquad (3.4)$$

So $p_2 - \lambda^2$ is divisible by 24. Since we need divisibility by 48, we must probe more deeply.

An extra factor of two arises as follows. Let x be any element of $H^4(X, \mathbf{Z})$. Then by a special case of the Wu formula,

$$x^2 \cong x \cdot \lambda \text{ modulo } 2. \qquad (3.5)$$

If, therefore, λ is divisible by two, then x^2 is even, and (3.4) implies that $(p_2 - \lambda^2)/48$ is integral, showing that the number of branes is integral, as promised. Note that formula (3.5) implies that the intersection form on $H^4(X, \mathbf{Z})$ is even when λ is divisible by two. Since this intersection form is in any case unimodular (by Poincaré duality), this gives another occurrence of even unimodular lattices in string theory.

From:

$$p_2 - \lambda^2 \cong 6\lambda^2 \text{ modulo } 1440.$$

we develop the formula, according to our further possible interpretation, as follows:

$p_2 - \lambda^2 \approx 6\lambda^2 / 1440$

$61768 - 61504 \cong 6*61504 / 1440$

$264 \cong 369.024 \text{ mod } 1440$

$264 \cong 256.2666$ $\lambda = 248$; $p_2 = 61768$

From:

$$x^2 \simeq x \cdot \lambda \text{ modulo } 2.$$

From our interpretation we take:

$x^2 \approx (x * \lambda) / 2$

$248*64 *24 / 24 \cong 380.928 /24 = x * \lambda = (125{,}9841 * 248) / 2 = 15.622{,}03162 \approx 15872$;

from:

$$p_2 - \lambda^2 \simeq 24x^2 \text{ modulo } 1440.$$

as above, we take $p_2 - \lambda^2 \approx 24x^2 / 1440$

$264 \cong (24 * 15872) / 1440$

$264 \cong 264{,}53333$

From:

$$J = \frac{p_2 - \lambda^2}{48}.$$

$J = 264/48 = 5.5$

And from:

$$I = \frac{1}{1440}\left(7\lambda^2 - p_2\right)$$

$I = (7 * 61504 - 61768) / 1440 = 256{,}083333$

$$\frac{I_Q}{2\pi} = -\frac{1}{6}\int_Q \left(w - \frac{1}{2}\lambda\right)\left((w - \frac{1}{2}\lambda)^2 - \frac{1}{8}(p_2 - \lambda^2)\right).$$

For:

α = 1

ω = 1+248/2 = 125

λ = 248

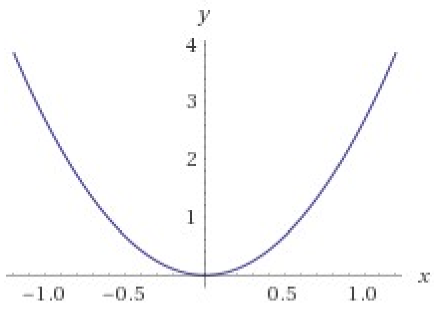
p_2 = 61768

-1/6 * integrate ((((125-1/2*248)*((125-124)^2-1/8(61768-61504))))x

Indefinite integral:

$$-\frac{1}{6}\int\left(\left(125 - \frac{248}{2}\right)\left((125 - 124)^2 - \frac{61768 - 61504}{8}\right)\right)x\,dx = \frac{8\,x^2}{3} + \text{constant}$$

Plot:



(x from −1.2 to 1.2)

(8 * 15872)/3 *2Pi for x = 125,98412

Input:

$$\frac{8\times 15872}{3}\times 2\pi$$

Result:

$$\frac{253\,952\,\pi}{3}$$

Decimal approximation:

265937.9125214783908313550708235321054825465211033689578160...

265937.912521…

Alternative representations:

$$\frac{1}{3}(2\pi)(8\times 15\,872) = 15\,237\,120\,°$$

- $$\frac{1}{3}(2\pi)(8\times 15\,872) = -\frac{253\,952}{3}\,i\log(-1)$$

- $$\frac{1}{3}(2\pi)(8\times 15\,872) = \frac{253\,952}{3}\cos^{-1}(-1)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\frac{1}{3}(2\pi)(8\times 15\,872) = \frac{1\,015\,808}{3}\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

- $$\frac{1}{3}(2\pi)(8\times 15\,872) = \sum_{k=0}^{\infty} -\frac{1\,015\,808\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{3(1+2k)}$$

- $$\frac{1}{3}(2\pi)(8\times 15\,872) = \frac{253\,952}{3}\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations:

$$\frac{1}{3}(2\pi)(8\times 15\,872) = \frac{1\,015\,808}{3}\int_0^1\sqrt{1-t^2}\,dt$$

- $$\frac{1}{3}(2\pi)(8\times 15\,872) = 63\,488\sqrt{3}+2\,031\,616\int_0^{\frac{1}{4}}\sqrt{-(-1+t)\,t}\,dt$$

-

$$\frac{1}{3}(2\pi)(8\times 15872) = \frac{507904}{3}\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

Note that:

4*(((8 * 15872)/3 *2Pi)))^1/3

Input:

$$4\sqrt[3]{\frac{8\times 15872}{3}\times 2\pi}$$

Exact result:

$$64\sqrt[3]{\frac{62\pi}{3}}$$

Decimal approximation:

257.22908712506187796302558337602315407623637562146140701 80...

257.229087…

Property:

$64\sqrt[3]{\frac{62\pi}{3}}$ is a transcendental number

Alternative representations:

$$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 4\sqrt[3]{15237120\,°}$$

- $$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 4\sqrt[3]{-\frac{253952}{3}\,i\log(-1)}$$

- $$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 4\sqrt[3]{\frac{253952}{3}\cos^{-1}(-1)}$$

log(x) is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 128\sqrt[3]{\frac{31}{3}}\sqrt[3]{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

- $$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 128\sqrt[3]{\frac{31}{3}}\sqrt[3]{\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

- $$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 64\sqrt[3]{\frac{62}{3}}\sqrt[3]{\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 128\sqrt[3]{\frac{31}{3}}\sqrt[3]{\int_0^1\sqrt{1-t^2}\,dt}$$

- $$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 64\sqrt[3]{62}\sqrt[3]{\int_0^{\infty}\frac{\sin^4(t)}{t^4}\,dt}$$

- $$4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)} = 64\times 2^{2/3}\sqrt[3]{\frac{31}{3}}\sqrt[3]{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

And:

(((((4*((((((((((8 * 15872)/3 *2Pi)))^1/3)))))))))))^1/11

Input:

$$\sqrt[11]{4\sqrt[3]{\frac{8\times 15872}{3}\times 2\pi}}$$

Exact result:

$$2^{19/33}\sqrt[33]{\frac{31\pi}{3}}$$

Decimal approximation:

1.656227559343547960028127856061446962027827778900828888259...

1.65622755… is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

Property:

$2^{19/33} \sqrt[33]{\frac{31\pi}{3}}$ is a transcendental number

All 11th roots of 64 ((62 π)/3)^(1/3):

Polar form

$2^{19/33} \sqrt[33]{\frac{31\pi}{3}}\ e^{0} \approx 1.6562$ (real, principal root)

- $2^{19/33} \sqrt[33]{\frac{31\pi}{3}}\ e^{(2 i \pi)/11} \approx 1.3933 + 0.8954\, i$
- $2^{19/33} \sqrt[33]{\frac{31\pi}{3}}\ e^{(4 i \pi)/11} \approx 0.6880 + 1.5066\, i$
- $2^{19/33} \sqrt[33]{\frac{31\pi}{3}}\ e^{(6 i \pi)/11} \approx -0.23571 + 1.6394\, i$
- $2^{19/33} \sqrt[33]{\frac{31\pi}{3}}\ e^{(8 i \pi)/11} \approx -1.0846 + 1.2517\, i$

Alternative representations:

$\sqrt[11]{4 \sqrt[3]{\frac{1}{3} (2\pi)(8 \times 15872)}} = \sqrt[11]{4 \sqrt[3]{15237120\,°}}$

- $\sqrt[11]{4 \sqrt[3]{\frac{1}{3} (2\pi)(8 \times 15872)}} = \sqrt[11]{4 \sqrt[3]{-\frac{253952}{3}\, i \log(-1)}}$
- $\sqrt[11]{4 \sqrt[3]{\frac{1}{3} (2\pi)(8 \times 15872)}} = \sqrt[11]{4 \sqrt[3]{\frac{253952}{3} \cos^{-1}(-1)}}$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = 2^{7/11}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

-

$$\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = 2^{7/11}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

-

$$\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = 2^{19/33}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = 2^{7/11}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\int_0^1\sqrt{1-t^2}\,dt}$$

$$\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = 2^{20/33}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

-

$$\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = 2^{20/33}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}$$

(13/10^3 + 2/10^3)+(((((4*((((((((((8 * 15872)/3 *2Pi)))^1/3))))))))))))^1/11

Input:

$$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{8\times 15\,872}{3}\times 2\pi}}$$

Exact result:

$$\frac{3}{200}+2^{19/33}\sqrt[33]{\frac{31\pi}{3}}$$

Decimal approximation:

1.671227559343547960028127856061446962027827778900828888259...

1.67122755… result very near to the value of holographic proton mass 1.6714213 * 10^{-24} gm.

Property:

$\frac{3}{200}+2^{19/33}\sqrt[33]{\frac{31\pi}{3}}$ is a transcendental number

-

Alternate forms:

$$\frac{1}{200}\left(3+200\times 2^{19/33}\sqrt[33]{\frac{31\pi}{3}}\right)$$

$$\frac{1}{600}\left(9+200\times 2^{19/33}\times 3^{32/33}\sqrt[33]{31\pi}\right)$$

Alternative representations:

$$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15\,872)}}=\frac{15}{10^3}+\sqrt[11]{4\sqrt[3]{15\,237\,120\,^\circ}}$$

-

$$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15\,872)}}=\frac{15}{10^3}+\sqrt[11]{4\sqrt[3]{-\frac{253\,952}{3}\,i\log(-1)}}$$

-

$$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15\,872)}}=\frac{15}{10^3}+\sqrt[11]{4\sqrt[3]{\frac{253\,952}{3}\cos^{-1}(-1)}}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = \frac{3}{200}+2^{7/11}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

- $$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = \frac{3}{200}+2^{7/11}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

- $$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = \frac{3}{200}+2^{19/33}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = \frac{3}{200}+2^{7/11}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\int_0^1\sqrt{1-t^2}\,dt}$$

- $$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = \frac{3}{200}+2^{20/33}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\int_0^\infty\frac{1}{1+t^2}\,dt}$$

- $$\left(\frac{13}{10^3}+\frac{2}{10^3}\right)+\sqrt[11]{4\sqrt[3]{\frac{1}{3}(2\pi)(8\times 15872)}} = \frac{3}{200}+2^{20/33}\sqrt[33]{\frac{31}{3}}\sqrt[33]{\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}$$

We obtain also:

(((((256^2+(248*64*24)+15872+(2*248)-2*5.5))))) - ((((((((8 * 15872)/3 * 2Pi)))

Input:

$$(256^2+248\times 64\times 24+15872+2\times 248-2\times 5.5)-\frac{8\times 15872}{3}\times 2\pi$$

Result:

196883.0875...

196883.0875… result practically eqal to a value of the following partition function:

$$Z_{24}(\tau) = j(\tau) - 744$$
$$= q^{-1} + 196884\, q + 21493760\, q^2 + 864299970\, q^3 + 20245856256\, q^4 + \ldots$$

Alternative representations:

$$(256^2 + 248 \times 64 \times 24 + 15\,872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3} (8 \times 15\,872) (2\,\pi) =$$
$$397\,285 - 15\,237\,120\,° + 256^2$$

-

$$(256^2 + 248 \times 64 \times 24 + 15\,872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3} (8 \times 15\,872) (2\,\pi) =$$
$$397\,285 + \frac{253\,952}{3}\, i \log(-1) + 256^2$$

-

$$(256^2 + 248 \times 64 \times 24 + 15\,872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3} (8 \times 15\,872) (2\,\pi) =$$
$$397\,285 - \frac{253\,952}{3} \cos^{-1}(-1) + 256^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$(256^2 + 248 \times 64 \times 24 + 15\,872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3} (8 \times 15\,872) (2\,\pi) =$$
$$462\,821 - 338\,603. \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2\,k}$$

-

$$(256^2 + 248 \times 64 \times 24 + 15\,872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3} (8 \times 15\,872) (2\,\pi) =$$
$$632\,122. - 169\,301. \sum_{k=1}^{\infty} \frac{2^k}{\binom{2\,k}{k}}$$

-

$$(256^2 + 248 \times 64 \times 24 + 15\,872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3} (8 \times 15\,872) (2\,\pi) =$$
$$462\,821 - 84\,650.7 \sum_{k=0}^{\infty} \frac{2^{-k} (-6 + 50\,k)}{\binom{3\,k}{k}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations:

$$(256^2 + 248 \times 64 \times 24 + 15872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3}(8 \times 15872)(2\pi) = 462821 - 169301.\int_0^\infty \frac{1}{1+t^2}\,dt$$

- $$(256^2 + 248 \times 64 \times 24 + 15872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3}(8 \times 15872)(2\pi) = 462821 - 338603.\int_0^1 \sqrt{1-t^2}\,dt$$

- $$(256^2 + 248 \times 64 \times 24 + 15872 + 2 \times 248 - 2 \times 5.5) - \frac{1}{3}(8 \times 15872)(2\pi) = 462821 - 169301.\int_0^\infty \frac{\sin(t)}{t}\,dt$$

((((8 * 15872)/3 *2Pi)))^1/2+(64*24-264-64+5.5)

Input:

$$\sqrt{\frac{8 \times 15872}{3} \times 2\pi} + (64 \times 24 - 264 - 64 + 5.5)$$

Result:

1729.1917...

1729.1917

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

((((((((8 * 15872)/3 *2Pi)))^1/2+(64*24-264-64+5.5)))))^1/15

Input:

$$\sqrt[15]{\sqrt{\frac{8\times 15\,872}{3}}\times 2\pi + (64\times 24 - 264 - 64 + 5.5)}$$

Result:

1.643827377...

1.643827… ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

Now, we devolop the same equations, but utilizing the “modulo”.

Thence:

from:

$$p_2 - \lambda^2 \cong 6\lambda^2 \text{ modulo } 1440.$$

We take $p_2 - \lambda^2 \approx 6\lambda^2 / 1440$

61896 – 61504 ≅ 6*61504 mod 1440

392 ≅ 369.024 mod 1440

392 ≅ 384 $\lambda = 248$; $p_2 = 61896$

From:

$$x^2 \cong x \cdot \lambda \text{ modulo } 2.$$

(((x*248 modulo 2)))

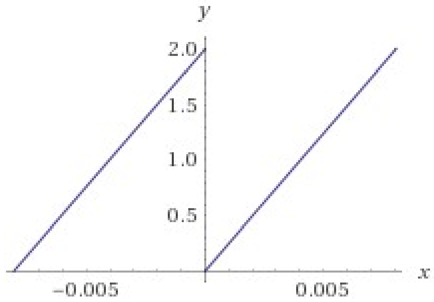
Input:

$(x\times 248) \bmod 2$

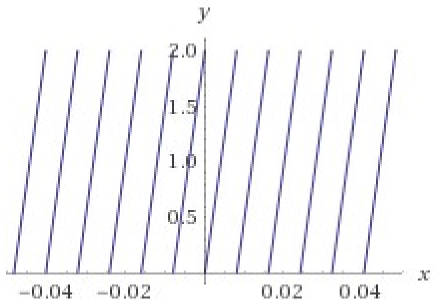
Result:

$(248\,x) \bmod 2$

Plots:



(x from −0.008 to 0.008)

- 

(x from −0.05 to 0.05)

- **Alternate form:**

  $248\,x - 2\lfloor 124\,x \rfloor$

  For any x is always equals to 0

  $\lfloor x \rfloor$ is the floor function

- **Integer root:**

  $x = n, \quad n \in \mathbb{Z}$

  $\mathbb{Z}$ is the set of integers

- **Derivative:**

  $$\frac{d}{dx}((x\,248) \bmod 2) = \begin{cases} 248 & \sin(124\,\pi\,x) \neq 0 \\ \text{indeterminate} & \text{(otherwise)} \end{cases}$$

  (assuming a function from reals to reals)

- **Alternative representations:**

  $(x\,248) \bmod 2 = 248\,x - 2\,\text{Quotient}[248\,x, 2]$

- $(x\,248) \bmod 2 = 248\,x + 2\lceil -124\,x \rceil$

-

$(x\,248) \bmod 2 = 248\,x - 2\lfloor 124\,x \rfloor$

$\lceil x \rceil$ is the ceiling function

Series representations:

$$(x\,248) \bmod 2 = 1 - \frac{2\sum_{k=1}^{\infty} \frac{\sin(248\,k\,\pi\,x)}{k}}{\pi} \quad \text{for } (x \in \mathbb{R} \text{ and } 124\,x \notin \mathbb{Z})$$

- $$(x\,248) \bmod 2 = 1 - \frac{1}{2}\sum_{k=1}^{1} \cot\left(\frac{k\,\pi}{2}\right)\sin(248\,k\,\pi\,x) \quad \text{for } (248\,x \in \mathbb{Z} \text{ and } 124\,x \notin \mathbb{Z})$$

$\mathbb{R}$ is the set of real numbers

$\cot(x)$ is the cotangent function

Definite integral over a half-period:

$$\int_0^{\frac{1}{248}} (248\,x) \bmod 2\,dx = \frac{1}{496} \approx 0.00201613$$

Definite integral over a period:

$$\int_0^{\frac{1}{124}} (248\,x) \bmod 2\,dx = \frac{1}{124} \approx 0.00806452$$

- **Definite integral mean square:**

$$\int_0^{\frac{1}{124}} 124\,(248\,x) \bmod 2^2\,dx = \frac{4}{3} \approx 1.33333$$

Thence: $x^2 = 0$; $x = 0$

from:

$$p_2 - \lambda^2 \cong 24x^2 \text{ modulo } 1440.$$

x^2 = x*248 modulo 2

We obtain: $p_2 - \lambda^2 = 0$

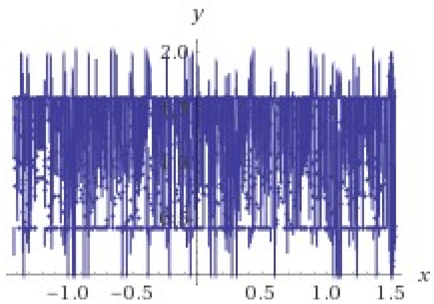
Input:

$(24\,(248\,x)) \bmod 2 \bmod 1440$

Result:

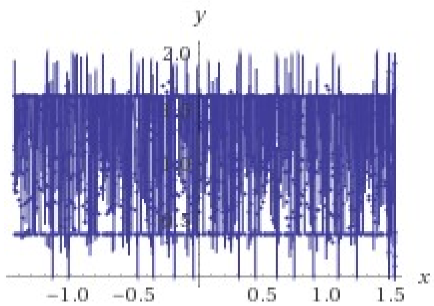
$(5952\,x) \bmod 2 \bmod 1440$

Plots:



(x from -1.4 to 1.5)

•



(x from -1.4 to 1.5)

•

Alternate form:

$$-2\lfloor 2976\,x\rfloor - 1440\left\lfloor\frac{5952\,x - 2\lfloor 2976\,x\rfloor}{1440}\right\rfloor + 5952\,x$$

For any x is always equal to 0

$\lfloor x\rfloor$ is the floor function

•

Alternate form assuming x is positive:

$(5952\,x) \bmod 2$

•

Integer root:

$x = n, \quad n \in \mathbb{Z}$

$\mathbb{Z}$ is the set of integers

-

Derivative:

$$\frac{d}{dx}((24\,(248\,x)) \bmod 2 \bmod 1440) =$$

$$\begin{cases} 5952 & \left(\sin(2976\,\pi\,x) > 0 \land \sin\left(\frac{\pi\,(5952\,x) \bmod 2}{1440}\right) > 0\right) \lor \\ & \left(\sin(2976\,\pi\,x) > 0 \land \sin\left(\frac{\pi\,(5952\,x) \bmod 2}{1440}\right) < 0\right) \lor \\ & \left(\sin(2976\,\pi\,x) < 0 \land \sin\left(\frac{\pi\,(5952\,x) \bmod 2}{1440}\right) > 0\right) \lor \\ & \left(\sin(2976\,\pi\,x) < 0 \land \sin\left(\frac{\pi\,(5952\,x) \bmod 2}{1440}\right) < 0\right) \\ \text{indeterminate} & (\text{otherwise}) \end{cases}$$

(assuming a function from reals to reals)

$e_1 \land e_2 \land \ldots$ is the logical AND function

$e_1 \lor e_2 \lor \ldots$ is the logical OR function

-

Alternative representations:

$(24 \times 248\,x) \bmod 2 \bmod 1440 = (5952\,x) \bmod 2 - 1440\ \text{Quotient}[(5952\,x) \bmod 2,\ 1440]$

- $$(24 \times 248\,x) \bmod 2 \bmod 1440 = -1440 \left\lfloor \frac{(5952\,x) \bmod 2}{1440} \right\rfloor + (5952\,x) \bmod 2$$

- $$(24 \times 248\,x) \bmod 2 \bmod 1440 = 1440 \left\lceil -\frac{(5952\,x) \bmod 2}{1440} \right\rceil + (5952\,x) \bmod 2$$

$\lceil x \rceil$ is the ceiling function

Series representations:

$$(24 \times 248\,x) \bmod 2 \bmod 1440 = 720 - \frac{1440 \sum_{k=1}^{\infty} \frac{\sin\left(\frac{1}{720}\,k\,\pi\,(5952\,x) \bmod 2\right)}{k}}{\pi}$$

$$\text{for } \left((5952\,x) \bmod 2 \in \mathbb{R} \text{ and } \frac{(5952\,x) \bmod 2}{1440} \notin \mathbb{Z}\right)$$

-

$$(24 \times 248\,x) \bmod 2 \bmod 1440 = 720 - \frac{1}{2}\sum_{k=1}^{1439} \cot\left(\frac{k\,\pi}{1440}\right)\sin\left(\frac{1}{720}\,k\,\pi\,(5952\,x) \bmod 2\right)$$

$$\text{for } \left((5952\,x) \bmod 2 \in \mathbb{Z} \text{ and } \frac{(5952\,x) \bmod 2}{1440} \notin \mathbb{Z}\right)$$

$\mathbb{R}$ is the set of real numbers

$\cot(x)$ is the cotangent function

Definite integral over a half-period:

$$\int_0^{\frac{1}{5952}} (5952\,x) \bmod 2 \bmod 1440\,dx = \frac{1}{11\,904} \approx 0.0000840054$$

- **Definite integral over a period:**

$$\int_0^{\frac{1}{2976}} (5952\,x) \bmod 2 \bmod 1440\,dx = \frac{1}{2976} \approx 0.000336022$$

- **Definite integral mean square:**

$$\int_0^{\frac{1}{2976}} 2976\,(5952\,x) \bmod 2 \bmod 1440^2\,dx = \frac{4}{3} \approx 1.33333$$

From:

$$J = \frac{p_2 - \lambda^2}{48}.$$

$J = 392/48 = 8,166666...$

And from:

$$I = \frac{1}{1440}\left(7\lambda^2 - p_2\right)$$

We take $p_2 - \lambda^2 \approx 6\lambda^2 / 1440$

61896 – 61504 ≅ 6*61504 mod 1440

I = (7 * 61504 – 61896) / 1440 = 255,99444444

$$\frac{I_Q}{2\pi} = -\frac{1}{6}\int_Q \left(w - \frac{1}{2}\lambda\right)\left((w-\frac{1}{2}\lambda)^2 - \frac{1}{8}(p_2 - \lambda^2)\right).$$

α = 1

ω = 1+248/2 = 125

λ = 248

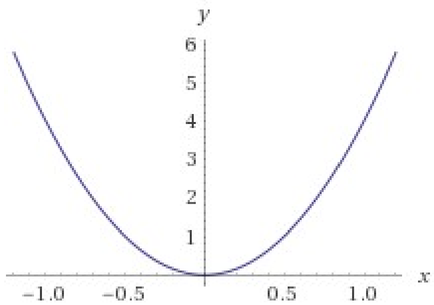
p_2 = 61896

-1/6 * integrate ((((125-1/2*248)*((125-124)^2-1/8(61896-61504))))x

Indefinite integral:

$$-\frac{1}{6}\int\left(\left(125-\frac{248}{2}\right)\left((125-124)^2-\frac{61\,896-61\,504}{8}\right)\right)x\,dx = 4\,x^2 + \text{constant}$$

Plot:



(x from −1.2 to 1.2)

For x = 8, we obtain I_Q / 2π:

(4*8^2)

Input:

4×8^2

Result:

256

256

Multiplying by 2π, we obtain I_Q :

(4*8^2)*2Pi

Input:

$(4 \times 8^2) \times 2\pi$

Result:

512π

512π

Decimal approximation:

1608.495438637974138092873412239105476708950732480054180339...

1608.49543…

Alternative representations:

$(2\pi) 4 \times 8^2 = 1440° 8^2$

- $(2\pi) 4 \times 8^2 = -8 i \log(-1) 8^2$

- $(2\pi) 4 \times 8^2 = 8 \cos^{-1}(-1) 8^2$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$(2\pi) 4 \times 8^2 = 2048 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

- $$(2\pi) 4 \times 8^2 = \sum_{k=0}^{\infty} -\frac{2048 (-1)^k \, 1195^{-1-2k} \left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1+2k}$$

- $$(2\pi) 4 \times 8^2 = 512 \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)$$

Integral representations:

$$(2\pi) 4 \times 8^2 = 2048 \int_0^1 \sqrt{1-t^2} \, dt$$

- $$(2\pi) 4 \times 8^2 = 1024 \int_0^1 \frac{1}{\sqrt{1-t^2}} \, dt$$

- $$(2\pi) 4 \times 8^2 = 1024 \int_0^{\infty} \frac{1}{1+t^2} \, dt$$

(55/10^3+8/10^3)+((((4*8^2)*2Pi)))*1/10^3

Input:

$$\left(\frac{55}{10^3} + \frac{8}{10^3}\right) + \left(\left(4 \times 8^2\right) \times 2\pi\right) \times \frac{1}{10^3}$$

Result:

$$\frac{63}{1000} + \frac{64\pi}{125}$$

Decimal approximation:

1.671495438637974138092873412239105476708950732480054180339...

1.6714954… result very near to the value of holographic proton mass 1.6714213 * 10^{-24} gm.

Property:

$\frac{63}{1000} + \frac{64\pi}{125}$ is a transcendental number

-

Alternate form:

$$\frac{63+512\pi}{1000}$$

Alternative representations:

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{10^3}+\frac{1440\,^\circ\,8^2}{10^3}$$

-

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{10^3}-\frac{8\,i\log(-1)\,8^2}{10^3}$$

-

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{10^3}+\frac{8\cos^{-1}(-1)\,8^2}{10^3}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{1000}+\frac{256}{125}\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

-

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{1000}+\sum_{k=0}^{\infty}-\frac{256\,(-1)^k\,5^{-2(2+k)}\times 239^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

-

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{1000}+\frac{64}{125}\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations:

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{1000}+\frac{256}{125}\int_0^1\sqrt{1-t^2}\,dt$$

•

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{1000}+\frac{128}{125}\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

•

$$\left(\frac{55}{10^3}+\frac{8}{10^3}\right)+\frac{(4\times 8^2)(2\pi)}{10^3}=\frac{63}{1000}+\frac{128}{125}\int_0^\infty\frac{1}{1+t^2}\,dt$$

(55+8)+((((4*8^2)*2Pi)))

Input:

$(55+8)+(4\times 8^2)\times 2\pi$

Result:

$63+512\pi$

Decimal approximation:

1671.495438637974138092873412239105476708950732480054180339...

1671.49543… result very near to the rest mass of Omega baryon 1672.45

Alternative representations:

$(55+8)+(2\pi)4\times 8^2=63+1440\circ 8^2$

•

$(55+8)+(2\pi)4\times 8^2=63-8\,i\log(-1)\,8^2$

•

$(55+8)+(2\pi)4\times 8^2=63+8\cos^{-1}(-1)\,8^2$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$(55+8)+(2\pi)4\times 8^2 = 63+2048\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

- $$(55+8)+(2\pi)4\times 8^2 = 63+\sum_{k=0}^{\infty}-\frac{2048\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

- $$(55+8)+(2\pi)4\times 8^2 = 63+512\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations:

$$(55+8)+(2\pi)4\times 8^2 = 63+2048\int_0^1\sqrt{1-t^2}\,dt$$

- $$(55+8)+(2\pi)4\times 8^2 = 63+1024\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

- $$(55+8)+(2\pi)4\times 8^2 = 63+1024\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

Note that:

$I_Q / 2\pi = 256$

$I = (7 * 61504 – 61896) / 1440 = 255,99444444$

$\lambda = 248$

$\omega = 1+248/2 =$ 125; $2\omega = 250$

$p_2 = 61896$; $\sqrt{61896} = 248,789067…$

From the sum of these results, we obtain:

(256 + 255.99444444 + 248 + 250 + 248.789067)

Input interpretation:

256 + 255.99444444 + 248 + 250 + 248.789067

Result:

1258.78351144

1258.78351144...

(256 + 255.99444444 + 248 + 250 + 248.789067)^1/14

Input interpretation:

$\sqrt[14]{256 + 255.99444444 + 248 + 250 + 248.789067}$

Result:

1.6650415468...

1.6650415468... is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

(256 + 255.99444444 + 248 + 250 + 248.789067)+(21^2+21+8)

Input interpretation:

$(256 + 255.99444444 + 248 + 250 + 248.789067) + (21^2 + 21 + 8)$

Result:

1728.78351144

1728.78351144

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

(((((256 + 255.99444444 + 248 + 250 + 248.789067)+(21^2+21+8)))))^1/15

Input interpretation:

$$\sqrt[15]{(256 + 255.99444444 + 248 + 250 + 248.789067) + (21^2 + 21 + 8)}$$

Result:

1.6438015064...

$1.6438015064... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Now:

$I_Q / 2\pi = 256$

$I = (7 * 61504 – 61896) / 1440 = 255,99444444$

$\lambda = 248$

$\omega = 1+248/2 = 125;$

$p_2 = 61896;$

from this other sum of the results, we obtain:

256 + 255,99444444 + 248 + 125 + 61896 = 62.780,99444444;

And √62.780,99444444 = 250,56135864

From the difference, we have instead:

61896 - 125 - 248 - 255,99444444 - 256 = 61.011,00555556

And √61.011,00555556 = 247,00405979

From the sum and the mean of two final results, we obtain:

247,00405979 + 250,56135864 = 497,56541843≈ 497.5654, result also practically equal to the rest mass of Kaon meson 497.614

And

(247,00405979 + 250,56135864) / 2 = 248,782709215

Note that:

1 / 0.63880683965117 ≈ 1,56541843 and 497.5654 – 1.5654183 = 496

From the following algebraic sum, we obtain:

256 - 248 + 255,99444444 - 125 = 138,99444444 result very near to the rest mass of Pion meson 139.57

We have that:

248,782709215 - 0,782709215 = 248 and 0,782709215 × 2 = 1,56541843;

1/(1,56541843) = 0,63880683965117

(497.5654 – 1.5654183) / (248,782709215 - 0,782709215) = 2

A)

1 ÷ 0,782709215 = 1,2776136793023447411437464678374

1 + 0,782709215 = 1,782709215

1,2776136793023447411437464678374 + 1,782709215 = 3,0603228943023447

B)

1,2776136793023447411437464678374 + 0,638806839 = 1,9164205183023447411437464678374; 1.9164205183 – 1 = 0.9164205183

0,782709215 - 0,6388068396 = 0,1439023754

0,1439023754 + 0.9164205183 = 1,0603228937;

3,06032289 – 1.06032289 = 2

From these expressions, we note a mathematical supersymmetry between the values and, consequently, of the two results (with regard the decimal digits that are identicals), whose difference is 2, that is equal to the ratio between 496 and 248 (dimensions of E_8 and E_8 x E_8).

This is a further confirmation, from a purely mathematical point of view, of the supersymmetry that is the necessary condition for the M-Theory to be valid and effective also from the physical point of view, as a completion of the Standard Model (Supersymmetric Standard Model).

From:

The "Parity" Anomaly on an Unorientable Manifold
Edward Witten
School of Natural Sciences, Institute for Advanced Study
Einstein Drive, Princeton, NJ 08540 USA

arXiv:1605.02391v3 [hep-th] 21 Nov 2016

The Dirac operator $\mathcal{D}_\varepsilon$ for a Majorana fermion, still with pin$^+$ structure P, but coupled to ε, is the same as the Dirac operator with pin$^+$ structure P', but coupled to gravity only. So, writing η_ε for the eta-invariant of $\mathcal{D}_\varepsilon$, it satisfies

$$\exp(-\pi i \eta_\varepsilon/2) = \exp(+2\pi i/16). \qquad (2.16)$$

What if $\nu = \dim R$ is not a multiple of 16? Then the bulk topological superconductor on X is nontrivial, and (2.21) cannot be correct; it describes a topological superconductor with boundary W whose worldvolume is X' rather than X! To fix the situation, let us recall the four-manifold X^* without boundary that is built by gluing X and X' along their common boundary (fig. 2). Let $\eta_0^{X^*}$ be the eta-invariant of the Dirac operator on X^* coupled to gravity only. Then the appropriate generalization of (2.21) for the partition function is

$$Z_{W;X} = |\mathrm{Pf}(\mathcal{D})| \exp(-\pi i \eta_R^{X'}/2) \exp(-\nu\pi i \eta_0^{X^*}/2). \qquad (2.22)$$

We denote this partition function as $Z_{W;X}$ because – since the bulk topological superconductor on X is now nontrivial – it does depend on X, not just on W. The gluing theorem for the eta-invariant can be used to show that this formula does not depend on the choice of the pin$^+$ manifold X' and the extension over X' of the gauge bundle and pin$^+$ structure. (Eqn. (2.22) is analogous to eqn. (3.41) in [22], where X was assumed to be orientable and a coupling to electromagnetism was incorporated.)

For:

$\exp(-i\pi\eta_{\overline{Y}}/2) = \pm 1$ for a closed manifold $\overline{Y}$,

We have that:

$$Z_{W;X} = |\mathrm{Pf}(\mathcal{D})| \exp(-\pi \mathrm{i} \eta_R^{X'}/2) \exp(-\nu \pi \mathrm{i} \eta_0^{X^*}/2).$$

10 * exp(1)* exp(64)

Input:

10 exp(1) exp(64)

Exact result:

$10\, e^{65}$

Decimal approximation:

$1.694889244410333714141783611437197494892623622551650 4\ldots \times 10^{29}$

$1.69488924\ldots * 10^{29}$

Property:

$10\, e^{65}$ is a transcendental number

Series representations:

$$10 \exp(1) \exp(64) = 10 \sum_{k=0}^{\infty} \frac{65^k}{k!}$$

- $$10 \exp(1) \exp(64) = 10 \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{65}$$

- $$10 \exp(1) \exp(64) = \frac{10}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}\right)^{65}}$$

$n!$ is the factorial function

2*ln((((10 * exp(1)* exp(64)))))

Input:

2 log(10 exp(1) exp(64))

$\log(x)$ is the natural logarithm

Exact result:

$2 \log\left(10\, e^{65}\right)$

Decimal approximation:

134.605170185988091368035982909368728415202202977257545952 0...

134.60517018… result very near to the rest mass of Pion meson 134.9766

Property:

$2\log\left(10\,e^{65}\right)$ is a transcendental number

Alternate forms:

$130+\log(100)$

- $2\,(65+\log(10))$

- $130+2\log(10)$

Alternative representations:

$2\log(10\exp(1)\exp(64)) = 2\log_e(10\exp(1)\exp(64))$

- $2\log(10\exp(1)\exp(64)) = 2\log(a)\log_a(10\exp(1)\exp(64))$

$\log_b(x)$ is the base- b logarithm

Series representations:

$$2\log(10\exp(1)\exp(64)) = 2\log\left(-1+10\,e^{65}\right)-2\sum_{k=1}^{\infty}\frac{\left(\frac{1}{1-10\,e^{65}}\right)^k}{k}$$

- $$2\log(10\exp(1)\exp(64)) = 4\,i\,\pi\left\lfloor\frac{\arg\left(10\,e^{65}-x\right)}{2\,\pi}\right\rfloor+2\log(x)-2\sum_{k=1}^{\infty}\frac{(-1)^k\left(10\,e^{65}-x\right)^k x^{-k}}{k} \quad \text{for } x<0$$

- $$2\log(10\exp(1)\exp(64)) = 4\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+2\log(z_0)-2\sum_{k=1}^{\infty}\frac{(-1)^k\left(10\,e^{65}-z_0\right)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$2\log(10\exp(1)\exp(64)) = 2\int_1^{10 e^{65}} \frac{1}{t}\,dt$$

- $$2\log(10\exp(1)\exp(64)) = -\frac{i}{\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\left(-1+10 e^{65}\right)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

((((10 * e^(1)* e^(64)))))^1/137

Where 1/137 is the fine-structure constant

Input:

$$\sqrt[137]{10\, e^1\, e^{64}}$$

Exact result:

$$\sqrt[137]{10}\; e^{65/137}$$

Decimal approximation:

1.634373818238102183903114378865171339841937013665629698534...

1.634373818…

Property:

$\sqrt[137]{10}\; e^{65/137}$ is a transcendental number

All 137th roots of 10 e^65:

Polar form

$$\sqrt[137]{10}\; e^{65/137}\, e^0 \approx 1.63437 \quad \text{(real, principal root)}$$

- $$\sqrt[137]{10}\; e^{65/137}\, e^{(2 i \pi)/137} \approx 1.63266 + 0.07493\, i$$

- $$\sqrt[137]{10}\; e^{65/137}\, e^{(4 i \pi)/137} \approx 1.62750 + 0.14970\, i$$

- $\sqrt[137]{10}\ e^{65/137}\ e^{(6 i \pi)/137} \approx 1.61893 + 0.22416 i$
- $\sqrt[137]{10}\ e^{65/137}\ e^{(8 i \pi)/137} \approx 1.60695 + 0.29815 i$
- $\vdots$

Alternative representation:

$$\sqrt[137]{10 e^1 e^{64}} = \sqrt[137]{10 \exp^1(z) \exp^{64}(z)} \quad \text{for } z = 1$$

Series representations:

$$\sqrt[137]{10 e^1 e^{64}} = \sqrt[137]{10} \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{65/137}$$

- $$\sqrt[137]{10 e^1 e^{64}} = \sqrt[137]{10} \left(\sum_{k=0}^{\infty} \frac{(-1+k)^2}{k!}\right)^{65/137}$$
- $$\sqrt[137]{10 e^1 e^{64}} = \sqrt[137]{10} \left(\frac{\sum_{k=0}^{\infty} \frac{-1+k+z}{k!}}{z}\right)^{65/137}$$

$n!$ is the factorial function

Integral representation:

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\Gamma(-a-s)}{z^s}\, ds}{(2 \pi i)\Gamma(-a)} \quad \text{for } (0 < \gamma < -\text{Re}(a) \text{ and } |\arg(z)| < \pi)$$

13/10^3 + ((((10 * e^(1)* e^(64)))))^1/137

Input:

$$\frac{13}{10^3} + \sqrt[137]{10 e^1 e^{64}}$$

Exact result:

$$\frac{13}{1000} + \sqrt[137]{10}\ e^{65/137}$$

Decimal approximation:

1.647373818238102183903114378865171339841937013665629698534...

$1.647373818\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Property:

$\frac{13}{1000} + \sqrt[137]{10}\, e^{65/137}$ is a transcendental number

-

Alternate form:

$\frac{13 + 1000\sqrt[137]{10}\, e^{65/137}}{1000}$

Alternative representation:

$\frac{13}{10^3} + \sqrt[137]{10\, e^1\, e^{64}} = \frac{13}{10^3} + \sqrt[137]{10 \exp^1(z) \exp^{64}(z)}$ for $z = 1$

Series representations:

$\frac{13}{10^3} + \sqrt[137]{10\, e^1\, e^{64}} = \frac{13}{1000} + \sqrt[137]{10} \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{65/137}$

-

$\frac{13}{10^3} + \sqrt[137]{10\, e^1\, e^{64}} = \frac{13}{1000} + \sqrt[137]{10} \left(\sum_{k=0}^{\infty} \frac{(-1+k)^2}{k!}\right)^{65/137}$

-

$\frac{13}{10^3} + \sqrt[137]{10\, e^1\, e^{64}} = \frac{13}{1000} + \sqrt[137]{10} \left(\frac{\sum_{k=0}^{\infty} \frac{-1+k+z}{k!}}{z}\right)^{65/137}$

$n!$ is the factorial function

2*sqrt(((((((6*(((((13/10^3 + ((((10 * e^(1)* e^(64)))))^1/137)))))))))))

Input:

$2\sqrt{6\left(\frac{13}{10^3} + \sqrt[137]{10\, e^1\, e^{64}}\right)}$

Exact result:

$2\sqrt{6\left(\frac{13}{1000} + \sqrt[137]{10}\, e^{65/137}\right)}$

Decimal approximation:

6.287843162620585944036752532698439211627320329174477125423...

6.28784316… ≈ 2π

Property:

$2\sqrt{6\left(\frac{13}{1000}+\sqrt[137]{10}\ e^{65/137}\right)}$ is a transcendental number

- **Alternate forms:**

$2\sqrt{\frac{39}{500}+6\sqrt[137]{10}\ e^{65/137}}$

- $\frac{1}{5}\sqrt{\frac{3}{5}\left(13+1000\sqrt[137]{10}\ e^{65/137}\right)}$

Series representations:

$$2\sqrt{6\left(\frac{13}{10^3}+\sqrt[137]{10\,e^1\,e^{64}}\right)}=2\sqrt{-\frac{461}{500}+6\sqrt[137]{10}\sqrt[137]{e^{65}}}\sum_{k=0}^{\infty}\left(-\frac{461}{500}+6\sqrt[137]{10}\sqrt[137]{e^{65}}\right)^{-k}\binom{\frac{1}{2}}{k}$$

- $$2\sqrt{6\left(\frac{13}{10^3}+\sqrt[137]{10\,e^1\,e^{64}}\right)}=2\sqrt{-\frac{461}{500}+6\sqrt[137]{10}\sqrt[137]{e^{65}}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{461}{500}+6\sqrt[137]{10}\sqrt[137]{e^{65}}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

- $$2\sqrt{6\left(\frac{13}{10^3}+\sqrt[137]{10\,e^1\,e^{64}}\right)}=2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{39}{500}+6\sqrt[137]{10}\sqrt[137]{e^{65}}-z_0\right)^k z_0^{-k}}{k!}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

From:

$$\exp(-\pi i \eta_\varepsilon/2) = \exp(+2\pi i/16).$$

We obtain:

(((((exp(2Pi/16))))

Input:

$\exp\left(2 \times \frac{\pi}{16}\right)$

Exact result:

$e^{\pi/8}$

Decimal approximation:

1.480972670489909971235241592730750047757757711232196091261...

1.48097267…

Property:

$e^{\pi/8}$ is a transcendental number

Alternative representations:

- $e^{(2\pi)/16} = e^{(360\,°)/16}$
- $e^{(2\pi)/16} = e^{-2/16\, i \log(-1)}$
- $e^{(2\pi)/16} = \exp^{\frac{2\pi}{16}}(z)$ for $z = 1$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

- $e^{(2\pi)/16} = e^{1/2 \sum_{k=0}^{\infty} (-1)^k/(1+2k)}$

$$e^{(2\pi)/16} = \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{\pi/8}$$

- $$e^{(2\pi)/16} = \left(\frac{1}{\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}}\right)^{\pi/8}$$

$n!$ is the factorial function

Integral representations:

$$e^{(2\pi)/16} = e^{1/2 \int_0^1 \sqrt{1-t^2}\, dt}$$

- $$e^{(2\pi)/16} = e^{1/4 \int_0^1 1/\sqrt{1-t^2}\, dt}$$
- $$e^{(2\pi)/16} = e^{1/4 \int_0^{\infty} 1/(1+t^2)\, dt}$$

(((((e^(2Pi/16))))^(16)))

Input:

$$\left(e^{2\times\pi/16}\right)^{16}$$

Exact result:

$$e^{2\pi}$$

Decimal approximation:

535.4916555247647365030493295890471814778057976032949155072...

535.49165…

Property:

$e^{2\pi}$ is a transcendental number

Alternative representations:

$$\left(e^{(2\pi)/16}\right)^{16} = \left(e^{(360°)/16}\right)^{16}$$

- $$\left(e^{(2\pi)/16}\right)^{16} = \left(e^{-2/16\, i \log(-1)}\right)^{16}$$

- $\left(e^{(2\pi)/16}\right)^{16} = \exp^{\frac{2\pi}{16}}(z)^{16}$ for $z = 1$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

$\left(e^{(2\pi)/16}\right)^{16} = e^{8\sum_{k=0}^{\infty}(-1)^k/(1+2k)}$

- $\left(e^{(2\pi)/16}\right)^{16} = \left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}$

- $\left(e^{(2\pi)/16}\right)^{16} = \left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{2\pi}$

$n!$ is the factorial function

Integral representations:

$\left(e^{(2\pi)/16}\right)^{16} = e^{8\int_0^1\sqrt{1-t^2}\,dt}$

- $\left(e^{(2\pi)/16}\right)^{16} = e^{4\int_0^1 1/\sqrt{1-t^2}\,dt}$

- $\left(e^{(2\pi)/16}\right)^{16} = e^{4\int_0^{\infty} 1/(1+t^2)\,dt}$

[4*(((((e^(2Pi/16))))^(16)))]^1/15

Input:

$\sqrt[15]{4\left(e^{2\times\pi/16}\right)^{16}}$

Exact result:

$2^{2/15}\,e^{(2\pi)/15}$

Decimal approximation:

1.667455221132136861597018144915787466840078632388203323204...

1.6674552211… is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

Property:

$2^{2/15}\, e^{(2\pi)/15}$ is a transcendental number

All 15th roots of 4 e^(2 π):

Polar form

$2^{2/15}\, e^{(2\pi)/15}\, e^0 \approx 1.6675$ (real, principal root)

- $2^{2/15}\, e^{(2\pi)/15}\, e^{(2i\pi)/15} \approx 1.52330 + 0.67822\, i$
- $2^{2/15}\, e^{(2\pi)/15}\, e^{(4i\pi)/15} \approx 1.1157 + 1.2392\, i$
- $2^{2/15}\, e^{(2\pi)/15}\, e^{(2i\pi)/5} \approx 0.5153 + 1.5858\, i$
- $2^{2/15}\, e^{(2\pi)/15}\, e^{(8i\pi)/15} \approx -0.1743 + 1.6583\, i$

Alternative representations:

$$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = \sqrt[15]{4\left(e^{(360°)/16}\right)^{16}}$$

- $$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = \sqrt[15]{4\left(e^{-2/16\, i\log(-1)}\right)^{16}}$$
- $$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = \sqrt[15]{4\exp^{\frac{2\pi}{16}}(z)^{16}} \quad \text{for } z = 1$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

$$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = 2^{2/15}\, e^{8/15 \sum_{k=0}^{\infty} (-1)^k/(1+2k)}$$

-

$$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = 2^{2/15}\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{(2\pi)/15}$$

- $$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = 2^{2/15}\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{(2\pi)/15}$$

$n!$ is the factorial function

Integral representations:

$$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = 2^{2/15}\, e^{8/15\int_0^1\sqrt{1-t^2}\,dt}$$

- $$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = 2^{2/15}\, e^{4/15\int_0^1 1/\sqrt{1-t^2}\,dt}$$

- $$\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = 2^{2/15}\, e^{4/15\int_0^\infty 1/(1+t^2)\,dt}$$

-21/10^3+[4*(((((e^(2Pi/16))))^(16)))]^1/15

Input:

$$-\frac{21}{10^3}+\sqrt[15]{4\left(e^{2\times\pi/16}\right)^{16}}$$

Exact result:

$$2^{2/15}\, e^{(2\pi)/15}-\frac{21}{1000}$$

Decimal approximation:

1.646455221132136861597018144915787466840078632388203323204...

$1.6464552211\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Property:

$-\frac{21}{1000}+2^{2/15}\, e^{(2\pi)/15}$ is a transcendental number

Alternate form:

$$\frac{1000\times 2^{2/15}\, e^{(2\pi)/15} - 21}{1000}$$

Alternative representations:

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{10^3} + \sqrt[15]{4\left(e^{(360\,°)/16}\right)^{16}}$$

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{10^3} + \sqrt[15]{4\left(e^{-2/16\, i \log(-1)}\right)^{16}}$$

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{10^3} + \sqrt[15]{4\exp^{\frac{2\pi}{16}}(z)^{16}} \quad \text{for } z = 1$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{1000} + 2^{2/15}\, e^{8/15 \sum_{k=0}^{\infty} (-1)^k/(1+2k)}$$

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{1000} + 2^{2/15}\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{(2\pi)/15}$$

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{1000} + 2^{2/15}\left(\frac{1}{\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}}\right)^{(2\pi)/15}$$

$n!$ is the factorial function

Integral representations:

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{1000} + 2^{2/15}\, e^{8/15 \int_0^1 \sqrt{1-t^2}\, dt}$$

- $$-\frac{21}{10^3} + \sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}} = -\frac{21}{1000} + 2^{2/15}\, e^{4/15 \int_0^1 1/\sqrt{1-t^2}\, dt}$$

-

$$-\frac{21}{10^3}+\sqrt[15]{4\left(e^{(2\pi)/16}\right)^{16}}=-\frac{21}{1000}+2^{2/15}\,e^{4/15\int_0^\infty 1/(1+t^2)\,dt}$$

From:

Golden Ratio and a Ramanujan-Type Integral

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Received: 1 November 2012; in revised form: 2 March 2013 / Accepted: 5 March 2013 / Published: 20 March 2013

We observe that:

Equation (4) is not easy to prove. One may ask, "How do we take the derivative of the *continued fraction* $R(q)$ on the left-hand side of it?" What comes to rescue us is the following remarkable identity due to Rogers and Ramanujan (who discovered it independently):

$$R(q)=q^{1/5}\prod_{n=1}^{\infty}\frac{(1-q^{5n-1})(1-q^{5n-4})}{(1-q^{5n-2})(1-q^{5n-3})} \qquad (5)$$

Before we move on, we note that the infinite products on right-hand side of Equation (5) are related to the first and the second Rogers–Ramanujan identities; e.g., see [7]; see also Part II of [3], where readers will find three different proofs of these famous identities.

From (5), we obtain, for q = 535.49165, that is the result of previous expression $(e^{2Pi/16})^{16}$:

535.49165^0.2 product ((1-535.49165^(5n-1)))*((1-535.49165^(5n-4))) / (((1-535.49165^(5n-2))*(1-535.49165^(5n-3))))), n=1..1152

Input interpretation:

$$535.49165^{0.2}\prod_{n=1}^{1152}\left(1-535.49165^{5n-1}\right)\times\frac{1-535.49165^{5n-4}}{\left(1-535.49165^{5n-2}\right)\left(1-535.49165^{5n-3}\right)}$$

Result:

3.50704

3.50704

1/4*[Pi + 535.49165^0.2 product ((1-535.49165^(5n-1)))*((1-535.49165^(5n-4))) / (((1-535.49165^(5n-2))*(1-535.49165^(5n-3))))), n=1..1152]

Input interpretation:

$$\frac{1}{4}\left(\pi + 535.49165^{0.2} \prod_{n=1}^{1152} \left(1 - 535.49165^{5n-1}\right) \times \frac{1 - 535.49165^{5n-4}}{\left(1 - 535.49165^{5n-2}\right)\left(1 - 535.49165^{5n-3}\right)}\right)$$

Result:

1.66216

1.66216 is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

1/ (((1/4*[Pi + 535.49165^0.2 product ((1-535.49165^(5n-1)))*((1-535.49165^(5n-4))) / (((1-535.49165^(5n-2))*(1-535.49165^(5n-3))))), n=1..1152])))

Input interpretation:

$$\frac{1}{\frac{1}{4}\left(\pi + 535.49165^{0.2} \prod_{n=1}^{1152} \left(1 - 535.49165^{5n-1}\right) \times \frac{1 - 535.49165^{5n-4}}{\left(1 - 535.49165^{5n-2}\right)\left(1 - 535.49165^{5n-3}\right)}\right)}$$

Result:

0.601628

0.601628

(((1/3*[(Pi)^(1/Pi) + 535.49165^0.2 product ((1-535.49165^(5n-1)))*((1-535.49165^(5n-4))) / (((1-535.49165^(5n-2))*(1-535.49165^(5n-3))))), n=1..1152])))

Input interpretation:

$$\frac{1}{3}\left(\sqrt[\pi]{\pi} + 535.49165^{0.2} \prod_{n=1}^{1152} \left(1 - 535.49165^{5n-1}\right) \times \frac{1 - 535.49165^{5n-4}}{\left(1 - 535.49165^{5n-2}\right)\left(1 - 535.49165^{5n-3}\right)}\right)$$

Result:

1.64889

1.64889 ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

From the (2.16) and (2.22), we can to obtain the following mathematical connections with the remarkable Rogers-Ramanujan identity:

$$\sqrt[15]{4\left(e^{2\times\pi/16}\right)^{16}}$$

$$= 2^{2/15}\, e^{(2\pi)/15} =$$

$$= 1.66745522113213686159701814491578746684007863238820332320 4\ldots \Rightarrow$$

$$\Rightarrow \frac{1}{4}\left(\pi + 535.49165^{0.2} \prod_{n=1}^{1152}\left(1-535.49165^{5n-1}\right)\times\frac{1-535.49165^{5n-4}}{\left(1-535.49165^{5n-2}\right)\left(1-535.49165^{5n-3}\right)}\right) =$$

$= 1.66216$; 1.6674552211... ≈ 1.66216

$$\frac{13}{10^3} + \sqrt[137]{10\, e^1\, e^{64}}$$

$$\frac{13}{1000} + \sqrt[137]{10}\, e^{65/137} =$$

$$= 1.64737381823810218390311437886517133984193701366562969853 4\ldots \Rightarrow$$

$$\Rightarrow \frac{1}{3}\left(\sqrt[\pi]{\pi} + 535.49165^{0.2} \prod_{n=1}^{1152}\left(1-535.49165^{5n-1}\right)\times\frac{1-535.49165^{5n-4}}{\left(1-535.49165^{5n-2}\right)\left(1-535.49165^{5n-3}\right)}\right) =$$

$= 1.64889$

$$-\frac{21}{10^3}+\sqrt[15]{4\left(e^{2\times\pi/16}\right)^{16}} \Rightarrow$$

$$\Rightarrow \quad 2^{2/15}\, e^{(2\pi)/15}-\frac{21}{1000} =$$

$= 1.646455221132136861597018144915787466840078632388203323204... \Rightarrow$

$$\Rightarrow \quad \frac{1}{3}\left(\sqrt[\pi]{\pi}+535.49165^{0.2}\prod_{n=1}^{1152}\left(1-535.49165^{5n-1}\right)\times\frac{1-535.49165^{5n-4}}{\left(1-535.49165^{5n-2}\right)\left(1-535.49165^{5n-3}\right)}\right) =$$

$= 1.64889$; 1.6473738... ≈ 1.646455... ≈ 1.64889

Thence we have the following mathematical linkage:

$$\exp(-\pi i \eta_\varepsilon/2) = \exp(+2\pi i/16). \Rightarrow$$

$$\Rightarrow Z_{W;X} = |\mathrm{Pf}(\mathcal{D})| \exp(-\pi i \eta_R^{X'}/2) \exp(-\nu\pi i \eta_0^{X^*}/2). \Rightarrow$$

$$R(q) = q^{1/5}\prod_{n=1}^{\infty}\frac{(1-q^{5n-1})(1-q^{5n-4})}{(1-q^{5n-2})(1-q^{5n-3})}$$

$\cong \zeta(2) = 1.64493...$

From

$$Z_{W;X} = |\mathrm{Pf}(\mathcal{D})| \exp(-\pi i \eta_R^{X'}/2) \exp(-\nu\pi i \eta_0^{X^*}/2).$$

we obtain:

1/4*ln((((10 * exp(1)* exp(64)))))

Input:

$$\frac{1}{4}\log(10\exp(1)\exp(64))$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{1}{4}\log\left(10\,e^{65}\right)$$

Decimal approximation:

16.825646273248511421004497863671091051900275372157193244 00...

16.82564627… result very near to the black hole entropy 16.8741

Property:

$\frac{1}{4}\log\left(10\,e^{65}\right)$ is a transcendental number

- **Alternate forms:**

$$\frac{1}{4}(65+\log(10))$$

- $$\frac{65}{4}+\frac{\log(10)}{4}$$

$$\frac{1}{4}(65+\log(2)+\log(5))$$

Alternative representations:

$$\frac{1}{4}\log(10\exp(1)\exp(64))=\frac{1}{4}\log_e(10\exp(1)\exp(64))$$

- $$\frac{1}{4}\log(10\exp(1)\exp(64))=\frac{1}{4}\log(a)\log_a(10\exp(1)\exp(64))$$

$\log_b(x)$ is the base- b logarithm

Series representations:

$$\frac{1}{4}\log(10\exp(1)\exp(64))=\frac{1}{4}\log\left(-1+10\,e^{65}\right)-\frac{1}{4}\sum_{k=1}^{\infty}\frac{\left(\frac{1}{1-10\,e^{65}}\right)^k}{k}$$

-

$$\frac{1}{4}\log(10\exp(1)\exp(64)) = \frac{1}{2} i\pi \left\lfloor \frac{\arg(10 e^{65} - x)}{2\pi} \right\rfloor + \frac{\log(x)}{4} - \frac{1}{4}\sum_{k=1}^{\infty} \frac{(-1)^k (10 e^{65} - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

- $$\frac{1}{4}\log(10\exp(1)\exp(64)) = \frac{1}{4}\left\lfloor \frac{\arg(10 e^{65} - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \frac{\log(z_0)}{4} + \frac{1}{4}\left\lfloor \frac{\arg(10 e^{65} - z_0)}{2\pi} \right\rfloor \log(z_0) - \frac{1}{4}\sum_{k=1}^{\infty} \frac{(-1)^k (10 e^{65} - z_0)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Integral representations:

$$\frac{1}{4}\log(10\exp(1)\exp(64)) = \frac{1}{4}\int_1^{10 e^{65}} \frac{1}{t}\, dt$$

- $$\frac{1}{4}\log(10\exp(1)\exp(64)) = -\frac{i}{8\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{(-1 + 10 e^{65})^{-s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds \quad \text{for } -1 < \gamma < 0$$

$\Gamma(x)$ is the gamma function

Now, inserting 16.82564627 as entropy in the Hawking radiation calculator, we obtain:

Mass = 3.821991e-8

Radius = 5.675089e-35

Temperature = 3.210901e+30

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.821991e-8)* sqrt[[-((((3.210901e+30 * 4*Pi*(5.675089e-35)^3-(5.675089e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{3.821991\times 10^{-8}} \sqrt{-\frac{3.210901\times 10^{30}\times 4\pi\left(5.675089\times 10^{-35}\right)^3-\left(5.675089\times 10^{-35}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249263798312597565939013075105849072557665776948070508...

1.61824926…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.821991e-8)* sqrt[[-((((3.210901e+30 * 4*Pi*(5.675089e-35)^3-(5.675089e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{3.821991\times 10^{-8}} \sqrt{-\frac{3.210901\times 10^{30}\times 4\pi\left(5.675089\times 10^{-35}\right)^3-\left(5.675089\times 10^{-35}\right)^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951771937053751511244088954914584051973981765191572982...

0.61795177…

From:

$$Z_{W;X} = |\mathrm{Pf}(\mathcal{D})| \exp(-\pi \mathrm{i} \eta_R^{X'}/2) \exp(-\nu \pi \mathrm{i} \eta_0^{X^*}/2).$$

(((10 * e^(1)* e^(64)))

We obtain also:

(34/10^3+3/10^3)+((((10 * e^(1)* e^(64)))))^1/137

Input:

$$\left(\frac{34}{10^3}+\frac{3}{10^3}\right)+\sqrt[137]{10\,e^1\,e^{64}}$$

Exact result:

$$\frac{37}{1000}+\sqrt[137]{10}\,e^{65/137}$$

Decimal approximation:

1.671373818238102183903114378865171339841937013665629698534...

1.671373818… result very near to the value of holographic proton mass 1.6714213 * 10^{-24} gm.

Property:

$\frac{37}{1000}+\sqrt[137]{10}\,e^{65/137}$ is a transcendental number

Alternate form:

$$\frac{37+1000\sqrt[137]{10}\,e^{65/137}}{1000}$$

Alternative representation:

$$\left(\frac{34}{10^3}+\frac{3}{10^3}\right)+\sqrt[137]{10\,e^1\,e^{64}}=\left(\frac{34}{10^3}+\frac{3}{10^3}\right)+\sqrt[137]{10\exp^1(z)\exp^{64}(z)} \text{ for } z=1$$

-

Series representations:

$$\left(\frac{34}{10^3}+\frac{3}{10^3}\right)+\sqrt[137]{10\,e^1\,e^{64}}=\frac{37}{1000}+\sqrt[137]{10}\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{65/137}$$

-

$$\left(\frac{34}{10^3}+\frac{3}{10^3}\right)+\sqrt[137]{10\,e^1\,e^{64}}=\frac{37}{1000}+\sqrt[137]{10}\left(\sum_{k=0}^{\infty}\frac{(-1+k)^2}{k!}\right)^{65/137}$$

-

$$\left(\frac{34}{10^3}+\frac{3}{10^3}\right)+\sqrt[137]{10\,e^1\,e^{64}}=\frac{37}{1000}+\sqrt[137]{10}\left(\frac{\sum_{k=0}^{\infty}\frac{-1+k+z}{k!}}{z}\right)^{65/137}$$

$n!$ is the factorial function

From the previous equation:

In detail, let $\overline{Y}$ be a closed three-manifold with spin structures α, β. The global anomaly is then measured by $\exp\left(-\frac{\pi i}{2}8(\eta_{\overline{Y},\alpha} - \eta_{\overline{Y},\beta})\right)$ where $\eta_{\overline{Y},\alpha}$ and $\eta_{\overline{Y},\beta}$ are η-invariants on $\overline{Y}$ for a Majorana fermion coupled to spin structure α or β. We note that this is trivial if and only if one always has

$$\exp\left(\frac{\pi i}{2}8\eta_{\overline{Y},\alpha}\right) = \exp\left(\frac{\pi i}{2}8\eta_{\overline{Y},\beta}\right), \tag{4.16}$$

or in other words if and only if the anomaly for 8 positive chirality fermions in two dimensions does not depend on the spin structure. This is how we formulated the question initially.

And

$\exp(-i\pi\eta_{\overline{Y}}/2) = \pm 1$ for a closed manifold $\overline{Y}$,

We can to obtain a mathematical connection with the following equation

thence, we have:

$$\Delta \ell n U = 8\,\frac{i\pi}{2}\left(\eta_\alpha(D) - \eta_\beta(D)\right) \bmod 2\pi i \tag{25}$$

$i\pi\eta_\alpha(D) / 2 = 1$; $i\pi\eta_\beta(D) / 2 = -1$

8 mod 2Pi*i + 8 mod 2Pi*i

((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))

Input:

$8 \bmod (2\pi i) + 8 \bmod (2\pi i)$

i is the imaginary unit

Exact result:

$16 - 8\pi$

Decimal approximation:

-9.132741228718345907701147066236023073577355195000846567 79...

-9.13274122…

Property:

$16 - 8\pi$ is a transcendental number

-

Alternate form:

$-8(\pi - 2)$

Alternative representations:

$8 \bmod (2\pi i) + 8 \bmod (2\pi i) = 16 - 4 i \pi \, \text{Quotient}[8, 2 i \pi]$

-

$$8 \bmod (2\pi i) + 8 \bmod (2\pi i) = 16 + 4 i \pi \left\lceil -\frac{8}{2 i \pi} \right\rceil$$

-

$$8 \bmod (2\pi i) + 8 \bmod (2\pi i) = 16 - 4 i \pi \left\lfloor \frac{8}{2 i \pi} \right\rfloor$$

$\lceil x \rceil$ is the ceiling function

$\lfloor x \rfloor$ is the floor function

Series representations:

$$8 \bmod (2\pi i) + 8 \bmod (2\pi i) = 16 - 32 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

-

$$8 \bmod (2\pi i) + 8 \bmod (2\pi i) = 16 + \sum_{k=0}^{\infty} \frac{32 (-1)^k \, 1195^{-1-2k} \left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1 + 2k}$$

-

$$8 \bmod (2\pi i) + 8 \bmod (2\pi i) = 16 - 8 \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1 + 2k} + \frac{2}{1 + 4k} + \frac{1}{3 + 4k}\right)$$

16*12*((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))

Input:

$16 \times 12 (8 \bmod (2\pi i) + 8 \bmod (2\pi i))$

i is the imaginary unit

Exact result:

$192\,(16 - 8\,\pi)$

Decimal approximation:

$-1753.486315913922414278620236717316430126852197440162541 01\ldots$

-1753.48631... result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV) with minus sign

Property:

$192\,(16 - 8\,\pi)$ is a transcendental number

- **Alternate forms:**

  $3072 - 1536\,\pi$

- $-1536\,(\pi - 2)$

Alternative representations:

$16 \times 12\,(8 \bmod (2\,\pi\,i) + 8 \bmod (2\,\pi\,i)) = 192\,(16 - 4\,i\,\pi\,\text{Quotient}[8,\, 2\,i\,\pi])$

- $16 \times 12\,(8 \bmod (2\,\pi\,i) + 8 \bmod (2\,\pi\,i)) = 768\,i\,\pi\left(i + \text{frac}\left(\frac{8}{2\,i\,\pi}\right)\right)$

- $16 \times 12\,(8 \bmod (2\,\pi\,i) + 8 \bmod (2\,\pi\,i)) = 192\left(16 + 4\,i\,\pi\left\lceil -\frac{8}{2\,i\,\pi}\right\rceil\right)$

$\text{frac}(x)$ is the fractional part function

$\lceil x \rceil$ is the ceiling function

Series representations:

$$16 \times 12\,(8 \bmod (2\,\pi\,i) + 8 \bmod (2\,\pi\,i)) = 3072 - 6144 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2\,k}$$

- $$16\times 12(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = 3072 + \sum_{k=0}^{\infty} \frac{6144(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4\times 239^{1+2k}\right)}{1+2k}$$

- $$16\times 12(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = 3072 - 1536\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)$$

sqrt(729)-16*12*((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))

Input:

$\sqrt{729} - 16\times 12(8 \bmod (2\pi i) + 8 \bmod (2\pi i))$

i is the imaginary unit

Exact result:

$27 - 192(16 - 8\pi)$

Decimal approximation:

1780.486315913922414278620236717316430126852197440162541017...

1780.48631… result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Property:

$27 - 192(16 - 8\pi)$ is a transcendental number

- **Alternate forms:**

$1536\pi - 3045$

- $3(512\pi - 1015)$

Alternative representations:

$$\sqrt{729} - 16\times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -192\,(16 - 4\,i\,\pi\,\text{Quotient}[8,\,2\,i\,\pi]) + \sqrt{729}$$

- $$\sqrt{729} - 16\times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -768\,i\,\pi\left(i + \text{frac}\left(\frac{8}{2\,i\,\pi}\right)\right) + \sqrt{729}$$

- $$\sqrt{729} - 16\times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -192\left(16 + 4\,i\,\pi\left\lceil -\frac{8}{2\,i\,\pi}\right\rceil\right) + \sqrt{729}$$

frac(x) is the fractional part function

$\lceil x \rceil$ is the ceiling function

Series representations:

$$\sqrt{729} - 16\times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -3045 + 6144\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

- $$\sqrt{729} - 16\times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -3045 + \sum_{k=0}^{\infty} -\frac{6144\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k} - 4\times 239^{1+2k}\right)}{1+2k}$$

- $$\sqrt{729} - 16\times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -3045 + 1536\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)$$

((((((((((sqrt(729)-16*12*((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))))))))))))))^1/15

Input:

$$\sqrt[15]{\sqrt{729} - 16\times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i))}$$

i is the imaginary unit

Exact result:

$$\sqrt[15]{27 - 192\,(16 - 8\,\pi)}$$

Decimal approximation:

1.647034043756832824097516513807161831782040935023692159783...

$1.64703404... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934...$

Property:

$\sqrt[15]{27 - 192(16 - 8\pi)}$ is a transcendental number

- **Alternate forms:**

$\sqrt[15]{1536\pi - 3045}$

- $\sqrt[15]{3(512\pi - 1015)}$

All 15th roots of 27 - 192 (16 - 8 π):

Polar form

$\sqrt[15]{27 - 192(16 - 8\pi)}\ e^0 \approx 1.64703$ (real, principal root)

- $\sqrt[15]{27 - 192(16 - 8\pi)}\ e^{(2 i \pi)/15} \approx 1.5046 + 0.6699 i$

- $\sqrt[15]{27 - 192(16 - 8\pi)}\ e^{(4 i \pi)/15} \approx 1.1021 + 1.2240 i$

- $\sqrt[15]{27 - 192(16 - 8\pi)}\ e^{(2 i \pi)/5} \approx 0.5090 + 1.5664 i$

- $\sqrt[15]{27 - 192(16 - 8\pi)}\ e^{(8 i \pi)/15} \approx -0.17216 + 1.63801 i$

Alternative representations:

$\sqrt[15]{\sqrt{729} - 16 \times 12 (8 \bmod (2\pi i) + 8 \bmod (2\pi i))} =$

$\sqrt[15]{-192(16 - 4 i \pi \text{ Quotient}[8, 2 i \pi]) + \sqrt{729}}$

-

$$\sqrt[15]{\sqrt{729} - 16 \times 12 (8 \bmod (2 \pi i) + 8 \bmod (2 \pi i))} = \sqrt[15]{-768 i \pi \left(i + \operatorname{frac}\left(\frac{8}{2 i \pi}\right)\right) + \sqrt{729}}$$

- $$\sqrt[15]{\sqrt{729} - 16 \times 12 (8 \bmod (2 \pi i) + 8 \bmod (2 \pi i))} = \sqrt[15]{-192 \left(16 + 4 i \pi \left\lceil -\frac{8}{2 i \pi} \right\rceil\right) + \sqrt{729}}$$

frac(x) is the fractional part function

$\lceil x \rceil$ is the ceiling function

Series representations:

$$\sqrt[15]{\sqrt{729} - 16 \times 12 (8 \bmod (2 \pi i) + 8 \bmod (2 \pi i))} = \sqrt[15]{-3045 + 6144 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2 k}}$$

- $$\sqrt[15]{\sqrt{729} - 16 \times 12 (8 \bmod (2 \pi i) + 8 \bmod (2 \pi i))} = \sqrt[15]{-3045 + \sum_{k=0}^{\infty} -\frac{6144 (-1)^k\, 1195^{-1-2 k} \left(5^{1+2 k} - 4 \times 239^{1+2 k}\right)}{1 + 2 k}}$$

- $$\sqrt[15]{\sqrt{729} - 16 \times 12 (8 \bmod (2 \pi i) + 8 \bmod (2 \pi i))} = \sqrt[15]{-3045 + 1536 \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1 + 2 k} + \frac{2}{1 + 4 k} + \frac{1}{3 + 4 k}\right)}$$

Integral representations:

$$\sqrt[15]{\sqrt{729} - 16 \times 12 (8 \bmod (2 \pi i) + 8 \bmod (2 \pi i))} = \sqrt[15]{-3045 + 6144 \int_0^1 \sqrt{1 - t^2}\, dt}$$

-

$$\sqrt[15]{\sqrt{729} - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i))} = \sqrt[15]{-3045 + 3072 \int_0^{\infty} \frac{1}{1+t^2}\,dt}$$

- $$\sqrt[15]{\sqrt{729} - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i))} = \sqrt[15]{-3045 + 3072 \int_0^{1} \frac{1}{\sqrt{1-t^2}}\,dt}$$

(21/10^3+3/10^3) + ((((((((((sqrt(729)-16*12*((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))))^1/15

Input:

$$\left(\frac{21}{10^3} + \frac{3}{10^3}\right) + \sqrt[15]{\sqrt{729} - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i))}$$

i is the imaginary unit

Exact result:

$$\frac{3}{125} + \sqrt[15]{27 - 192\,(16 - 8\pi)}$$

Decimal approximation:

1.671034043756832824097516513807161831782040935023692159783...

1.67103404…

We note that 1.67103404... is a result practically equal to the value of the formula:

$m_{p'} = 2 \times \frac{\eta}{R} m_P = 1.6714213 \times 10^{-24}$ gm

that is the holographic proton mass

Property:

$\frac{3}{125} + \sqrt[15]{27 - 192\,(16 - 8\pi)}$ is a transcendental number

-

Alternate forms:

$$\frac{3}{125} + \sqrt[15]{1536\pi - 3045}$$

-

$$\frac{1}{125}\left(3+125\sqrt[15]{3(512\pi-1015)}\right)$$

Alternative representations:

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12(8\bmod(2\pi i)+8\bmod(2\pi i))}=\frac{24}{10^3}+\sqrt[15]{-192(16-4i\pi\,\text{Quotient}[8,2i\pi])+\sqrt{729}}$$

-

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12(8\bmod(2\pi i)+8\bmod(2\pi i))}=\frac{24}{10^3}+\sqrt[15]{-768i\pi\left(i+\text{frac}\left(\frac{8}{2i\pi}\right)\right)+\sqrt{729}}$$

-

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12(8\bmod(2\pi i)+8\bmod(2\pi i))}=\frac{24}{10^3}+\sqrt[15]{-192\left(16+4i\pi\left\lceil-\frac{8}{2i\pi}\right\rceil\right)+\sqrt{729}}$$

frac(x) is the fractional part function

$\lceil x\rceil$ is the ceiling function

Series representations:

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12(8\bmod(2\pi i)+8\bmod(2\pi i))}=\frac{3}{125}+\sqrt[15]{-3045+6144\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

-

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = \frac{3}{125}+\sqrt[15]{-3045+\sum_{k=0}^{\infty}-\frac{6144\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

•

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = \frac{3}{125}+\sqrt[15]{-3045+1536\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = \frac{3}{125}+\sqrt[15]{-3045+6144\int_0^1\sqrt{1-t^2}\,dt}$$

•

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = \frac{3}{125}+\sqrt[15]{-3045+3072\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

•

$$\left(\frac{21}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = \frac{3}{125}+\sqrt[15]{-3045+3072\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}$$

-(21/10^3+8/10^3) + ((((((((((sqrt(729)-16*12*((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))))^1/15

Input:

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))}$$

i is the imaginary unit

Exact result:

$$\sqrt[15]{27-192(16-8\pi)}-\frac{29}{1000}$$

Decimal approximation:

1.618034043756832824097516513807161831782040935023692159783...

1.618034043756832824… ≈ ϕ

Property:

$$-\frac{29}{1000}+\sqrt[15]{27-192(16-8\pi)}\text{ is a transcendental number}$$

- **Alternate forms:**

$$\sqrt[15]{1536\pi-3045}-\frac{29}{1000}$$

- $$\frac{1000\sqrt[15]{3(512\pi-1015)}-29}{1000}$$

Alternative representations:

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{10^3}+\sqrt[15]{-192(16-4 i\pi \text{ Quotient}[8, 2 i\pi])+\sqrt{729}}$$

- $$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{10^3}+\sqrt[15]{-768 i\pi\left(i+\text{frac}\left(\frac{8}{2 i\pi}\right)\right)+\sqrt{729}}$$

-

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{10^3}+\sqrt[15]{-192\left(16+4 i\pi\left\lceil-\frac{8}{2 i\pi}\right\rceil\right)+\sqrt{729}}$$

frac(x) is the fractional part function

$\lceil x \rceil$ is the ceiling function

Series representations:

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{1000}+\sqrt[15]{-3045+6144\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

- $$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{1000}+\sqrt[15]{-3045+\sum_{k=0}^{\infty}-\frac{6144\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

- $$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{1000}+\sqrt[15]{-3045+1536\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{1000}+\sqrt[15]{-3045+6144\int_0^1\sqrt{1-t^2}\,dt}$$

-

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{1000}+\sqrt[15]{-3045+3072\int_0^\infty \frac{1}{1+t^2}\,dt}$$

-

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{\sqrt{729}-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))} = -\frac{29}{1000}+\sqrt[15]{-3045+3072\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt}$$

From the above result (approximation almost equal to the golden ratio), we obtain the following interesting expression:

-ln(1.618034043756832824)-24-16*12*((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))

Input interpretation:

$$-\log(1.618034043756832824)-24-16\times 12\,(8 \bmod (2\pi i)+8 \bmod (2\pi i))$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Result:

1729.005104054866654123...

1729.00510405…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Alternative representations:

$$-\log(1.618034043756832824 0000) - 24 - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -24 - 192\left(16 + 4 i \pi \left\lceil -\frac{8}{2 i \pi} \right\rceil\right) - \log(1.618034043756832824 0000)$$

•

$$-\log(1.618034043756832824 0000) - 24 - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -24 - 192\left(16 + 4 i \pi \left\lceil -\frac{8}{2 i \pi} \right\rceil\right) - \log_e(1.618034043756832824 0000)$$

•

$$-\log(1.618034043756832824 0000) - 24 - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -24 - 192\left(16 + 4 i \pi \left\lceil -\frac{8}{2 i \pi} \right\rceil\right) - \log(a)\log_a(1.618034043756832824 0000)$$

$\lceil x \rceil$ is the ceiling function

$\log_b(x)$ is the base- b logarithm

Integral representations:

$$-\log(1.618034043756832824 0000) - 24 - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -24 - \int_1^{1.618034043756832824 0000} \frac{1}{t}\,dt - 384\,8 \bmod (2 i \pi)$$

•

$$-\log(1.618034043756832824 0000) - 24 - 16 \times 12\,(8 \bmod (2\pi i) + 8 \bmod (2\pi i)) = -24 - \frac{1}{2\pi \mathcal{A}} \int_{-\mathcal{A}\infty+\gamma}^{\mathcal{A}\infty+\gamma} \frac{e^{0.481211736056512146 3787 s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds - 384\,8 \bmod (2 i \pi) \quad \text{for } -1 < \gamma < 0$$

Now, we have:

$$\Delta \ell n X = -2\pi i \int_B \left(\hat{A}(A^a) - \hat{A}(0)\right) = -\frac{2\pi i}{2 \cdot (2\pi)^2} \int_B F \wedge F$$

$$= \frac{2\pi i}{2 \cdot (2\pi)^2} \int_0^1 d\rho \int_0^{2\pi} d\tau \int_0^{2\pi} d\sigma \int_0^1 du \left(\frac{k^{(a)}}{n}\right)^2 n(1-\rho)$$

$$= 2\pi i \frac{(k^{(a)})^2}{2n} \bmod 2\pi i \qquad (43)$$

For n = 1 and

$\exp(-i\pi\eta_{\overline{Y}}/2) = \pm 1$ for a closed manifold $\overline{Y}$,

we obtain: $\pi i(k^{(a)^2})/2 = \pm 1$. Thence, for -1, we have:

-(2 mod 2Pi*i)

Input:

$-2 \bmod (2\pi i)$

i is the imaginary unit

Exact result:

$2\pi - 2$

Decimal approximation:

4.283185307179586476925286766559005768394338798750211641949...

4.283185307… = $2(\pi - 1)$

Property:

$-2 + 2\pi$ is a transcendental number

- **Alternate form:**

$2(\pi - 1)$

Alternative representations:

$-2 \bmod (2\pi i) = -2 + 2 i \pi \text{ Quotient}[2, 2 i \pi]$

- $-2 \bmod (2\pi i) = -2 - 2 i \pi \left\lceil -\frac{2}{2 i \pi} \right\rceil$

- $-2 \bmod (2\pi i) = -2 + 2 i \pi \left\lfloor \frac{2}{2 i \pi} \right\rfloor$

$\lceil x \rceil$ is the ceiling function

$\lfloor x \rfloor$ is the floor function

Series representations:

$$-2 \bmod (2 \pi i) = -2 + 8 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

- $$-2 \bmod (2 \pi i) = -2 + \sum_{k=0}^{\infty} -\frac{8 (-1)^k \, 1195^{-1-2k} \left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1+2k}$$

- $$-2 \bmod (2 \pi i) = -2 + 2 \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)$$

From: 4.283185307… = $2(\pi - 1)$, we obtain adding 2:

2(π-1)+2

Input:

$2(\pi - 1) + 2$

Result:

2π

Decimal approximation:

6.283185307179586476925286766559005768394338798750211641949...

6.283185307… ≈ 2π

Property:

$2 + 2(-1 + \pi)$ is a transcendental number

$2\sqrt{6\,\zeta(2)} \approx$
6.28318530717958647692528676655900576839433879875021164194988918

From the result, we obtain:

(2Pi)^2/(24)

Input:

$$\frac{1}{24}(2\pi)^2$$

Result:

$$\frac{\pi^2}{6}$$

Decimal approximation:

1.6449340668482264364724151666460251892189499012067984377355...

1.64493406… = ζ(2)

Property:

$\frac{\pi^2}{6}$ is a transcendental number

Alternative representations:

$$\frac{1}{24}(2\pi)^2 = \frac{1}{24}(360°)^2$$

- $$\frac{1}{24}(2\pi)^2 = \frac{1}{24}(-2 i \log(-1))^2$$

- $$\frac{1}{24}(2\pi)^2 = \frac{1}{24}\left(2\cos^{-1}(-1)\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\frac{1}{24}(2\pi)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

- $$\frac{1}{24}(2\pi)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

•

$$\frac{1}{24}(2\pi)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{1}{24}(2\pi)^2 = \frac{8}{3}\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

•

$$\frac{1}{24}(2\pi)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

•

$$\frac{1}{24}(2\pi)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We have also that:

-0.57721566490153286+16*18+(((-(2 mod 2Pi*i))))^5

Where 0.5772156… is the Euler-Mascheroni constant

Input interpretation:

$$-0.57721566490153286 + 16\times 18 + (-2 \bmod (2\pi i))^5$$

i is the imaginary unit

Result:

1728.9880859454296300...

1728.988085…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Alternative representations:

$$-0.57721566490153286000 + 16 \times 18 + (-2 \bmod (2\pi i))^5 = 287.42278433509846714000 + (-2 + 2 i \pi \,\text{Quotient}[2, 2 i \pi])^5$$

•

$$-0.57721566490153286000 + 16 \times 18 + (-2 \bmod (2\pi i))^5 = 287.42278433509846714000 + \left(-2 - 2 i \pi \left\lceil -\frac{2}{2 i \pi} \right\rceil\right)^5$$

•

$$-0.57721566490153286000 + 16 \times 18 + (-2 \bmod (2\pi i))^5 = 287.42278433509846714000 + \left(-2 + 2 i \pi \left\lfloor \frac{2}{2 i \pi} \right\rfloor\right)^5$$

$\lceil x \rceil$ is the ceiling function

$\lfloor x \rfloor$ is the floor function

We have also that:

89+13+(((-(2 mod 2Pi*i))))^6

Input:

$$89 + 13 + (-2 \bmod (2\pi i))^6$$

i is the imaginary unit

Exact result:

$$102 + (2\pi - 2)^6$$

Decimal approximation:

6276.491319197279509925873733044497562326001715042372389094...

6276.491319… result practically equal to the rest mass of Charmed B meson 6276

Property:

$102 + (-2 + 2\pi)^6$ is a transcendental number

•

Alternate forms:

$$102 + (2 - 2\pi)^6$$

•

$$166 - 384\pi + 960\pi^2 - 1280\pi^3 + 960\pi^4 - 384\pi^5 + 64\pi^6$$

- $$2\left(83 - 192\pi + 480\pi^2 - 640\pi^3 + 480\pi^4 - 192\pi^5 + 32\pi^6\right)$$

Alternative representations:

$$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + (-2 + 2 i \pi \text{ Quotient}[2, 2 i \pi])^6$$

- $$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + \left(-2 - 2 i \pi \left\lceil -\frac{2}{2 i \pi} \right\rceil\right)^6$$

- $$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + \left(-2 + 2 i \pi \left\lfloor \frac{2}{2 i \pi} \right\rfloor\right)^6$$

$\lceil x \rceil$ is the ceiling function

$\lfloor x \rfloor$ is the floor function

Series representations:

$$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + \left(2 - 8 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^6$$

- $$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + \left(-2 + 2 \sum_{k=0}^{\infty} -\frac{4(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1+2k}\right)^6$$

- $$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + 64\left(-1 + \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)\right)^6$$

Integral representations:

$$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + \left(2 - 8 \int_0^1 \sqrt{1-t^2}\, dt\right)^6$$

- $$89 + 13 + (-2 \bmod (2\pi i))^6 = 102 + \left(2 - 4 \int_0^{\infty} \frac{1}{1+t^2}\, dt\right)^6$$

•

$$89 + 13 + (-2 \bmod (2 \pi i))^6 = 102 + \left(2 - 4 \int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt\right)^6$$

Now, we take:

$$2\pi i \, \frac{(k^{(a)})^2}{2n} \bmod 2\pi i$$

for n = 1:

$\pi i(k^{(a)^2})/2 = \pm 128$. Thence, for -128, we have:

((((-(128*2 mod 2Pi*i)))))

Input:

$-(128 \times 2) \bmod (2 \pi i)$

i is the imaginary unit

Exact result:

$82 \pi - 256$

Decimal approximation:

1.610597594363045553936757428919236504167890748758677319945...

1.610597594….

Property:

$-256 + 82 \pi$ is a transcendental number

•

Alternate form:

$2 (41 \pi - 128)$

•

Alternative representations:

$-(128 \times 2) \bmod (2 \pi i) = -256 + 2 i \pi$ Quotient[256, 2 $i \pi$]

•

$$-(128\times 2)\bmod(2\pi i) = -256 - 2 i\pi \left\lceil -\frac{256}{2 i\pi} \right\rceil$$

- $$-(128\times 2)\bmod(2\pi i) = -256 + 2 i\pi \left\lfloor \frac{256}{2 i\pi} \right\rfloor$$

$\lceil x\rceil$ is the ceiling function

$\lfloor x\rfloor$ is the floor function

Series representations:

$$-(128\times 2)\bmod(2\pi i) = -256 + 328 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

- $$-(128\times 2)\bmod(2\pi i) = -256 + \sum_{k=0}^{\infty} -\frac{328\,(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4\times 239^{1+2k}\right)}{1+2k}$$

- $$-(128\times 2)\bmod(2\pi i) = -256 + 82 \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)$$

8/10^3+((((-(128*2 mod 2Pi*i)))))

Input:

$$\frac{8}{10^3} - (128\times 2)\bmod(2\pi i)$$

i is the imaginary unit

Exact result:

$$82\pi - \frac{31999}{125}$$

Decimal approximation:

1.618597594363045553936757428919236504167890748758677319945...

1.618597594…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Property:

$-\frac{31999}{125} + 82\pi$ is a transcendental number

•

Alternate form:

$\frac{1}{125}(10250\pi - 31999)$

Alternative representations:

• More

$\frac{8}{10^3} - (128 \times 2) \bmod (2\pi i) = -256 + \frac{8}{10^3} + 2i\pi\,\text{Quotient}[256, 2i\pi]$

•

$\frac{8}{10^3} - (128 \times 2) \bmod (2\pi i) = -256 - 2i\pi\left\lceil -\frac{256}{2i\pi}\right\rceil + \frac{8}{10^3}$

•

$\frac{8}{10^3} - (128 \times 2) \bmod (2\pi i) = -256 + 2i\pi\left\lfloor \frac{256}{2i\pi}\right\rfloor + \frac{8}{10^3}$

$\lceil x \rceil$ is the ceiling function

$\lfloor x \rfloor$ is the floor function

Series representations:

$\frac{8}{10^3} - (128 \times 2) \bmod (2\pi i) = -\frac{31999}{125} + 328\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$

•

$\frac{8}{10^3} - (128 \times 2) \bmod (2\pi i) = -\frac{31999}{125} + \sum_{k=0}^{\infty} -\frac{328(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1+2k}$

•

$$\frac{8}{10^3} - (128 \times 2) \bmod (2 \pi i) = -\frac{31999}{125} + 82 \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)$$

Integral representations:

$$\frac{8}{10^3} - (128 \times 2) \bmod (2 \pi i) = -\frac{31999}{125} + 328 \int_0^1 \sqrt{1-t^2}\, dt$$

- $$\frac{8}{10^3} - (128 \times 2) \bmod (2 \pi i) = -\frac{31999}{125} + 164 \int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt$$

- $$\frac{8}{10^3} - (128 \times 2) \bmod (2 \pi i) = -\frac{31999}{125} + 164 \int_0^{\infty} \frac{1}{1+t^2}\, dt$$

For:

$\pi i(k^{(a)^2})/2 = \pm 272$. Thence, for -272, we have:

48/10^3+ sqrt((((-(272*2 mod 2Pi*i)))))

Input:

$$\frac{48}{10^3} + \sqrt{-(272 \times 2) \bmod (2 \pi i)}$$

i is the imaginary unit

Exact result:

$$\frac{6}{125} + \sqrt{174 \pi - 544}$$

Decimal approximation:

1.671921711359271005328308291631642741621988943821488964101...

1.67192171…

We note that 1.671159628... is a result practically equal to the value of the formula:

$m_{p'} = 2 \times \frac{\eta}{R} m_P = 1.6714213 \times 10^{-24}$ gm

that is the holographic proton mass

Property:

$\frac{6}{125} + \sqrt{-544 + 174\pi}$ is a transcendental number

- **Alternate form:**

$\frac{1}{125}\left(6 + 125\sqrt{2(87\pi - 272)}\right)$

Alternative representations:

$$\frac{48}{10^3} + \sqrt{-(272 \times 2) \bmod (2\pi i)} = \frac{48}{10^3} + \sqrt{-544 + 2 i \pi \, \text{Quotient}[544, 2 i \pi]}$$

- $$\frac{48}{10^3} + \sqrt{-(272 \times 2) \bmod (2\pi i)} = \frac{48}{10^3} + \sqrt{-544 - 2 i \pi \left\lceil -\frac{544}{2 i \pi} \right\rceil}$$

- $$\frac{48}{10^3} + \sqrt{-(272 \times 2) \bmod (2\pi i)} = \frac{48}{10^3} + \sqrt{-544 + 2 i \pi \left\lfloor \frac{544}{2 i \pi} \right\rfloor}$$

$\lceil x \rceil$ is the ceiling function

$\lfloor x \rfloor$ is the floor function

- **Series representations:**

$$\frac{48}{10^3} + \sqrt{-(272 \times 2) \bmod (2\pi i)} = \frac{6}{125} + \sqrt{-1 - 544 \bmod (2 i \pi)} \sum_{k=0}^{\infty} \binom{\frac{1}{2}}{k} (-1 - 544 \bmod (2 i \pi))^{-k}$$

-

$$\frac{48}{10^3} + \sqrt{-(272 \times 2) \bmod (2 \pi i)} = \frac{6}{125} + \sqrt{-1 - 544 \bmod (2 i \pi)} \sum_{k=0}^{\infty} \frac{(-1)^k (-1 - 544 \bmod (2 i \pi))^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

- $$\frac{48}{10^3} + \sqrt{-(272 \times 2) \bmod (2 \pi i)} = \frac{6}{125} + \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (-544 \bmod (2 i \pi) - z_0)^k z_0^{-k}}{k!}$$
for not $((z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

From:

Anomalies in String Theory with D-Branes
Daniel S. Freed - Edward Witten
Department of Mathematics, University of Texas at Austin
School of Natural Sciences, Institute for Advanced Study
July 15, 1999

$$-\frac{1}{2}(1 - \frac{p_1}{24})(8 - p_1) - \frac{1}{4}(4 + \frac{p_1}{3})(p_1 - 4),$$

(((-1/2(1-p/24)(8-p)))) – (((1/4(4+p/3)(p-4))))

-1/2 (8 - p) (1 - p/24) - 1/4 (4 - p/3) (4 - p)

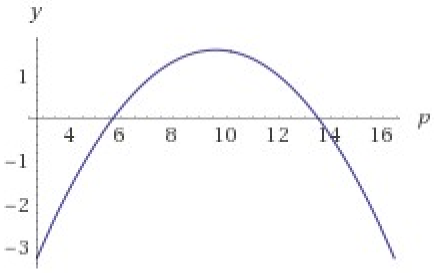
Input:

$$-\frac{1}{2}(8 - p)\left(1 - \frac{p}{24}\right) - \frac{1}{4}\left(4 - \frac{p}{3}\right)(4 - p)$$

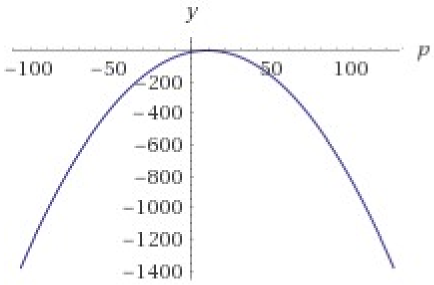
Result:

$-\frac{1}{4}(4-p)\left(4-\frac{p}{3}\right)-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)$

Plots:



(p from 2.8 to 16.4)

- 

(p from -105.6 to 124.8)

-

Geometric figure:

line

Alternate forms:

$-\frac{1}{48}(5p^2-96p+384)$

- $\frac{8}{5}-\frac{1}{240}(5p-48)^2$

$-\frac{5p^2}{48}+2p-8$

-

Roots:

$p=\frac{48}{5}-\frac{8\sqrt{6}}{5}$

- $p=\frac{48}{5}+\frac{8\sqrt{6}}{5}$

Polynomial discriminant:

$\Delta=\frac{2}{3}$

-

Derivative:

$\frac{d}{dp}\left(-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)-\frac{1}{4}\left(4-\frac{p}{3}\right)(4-p)\right)=2-\frac{5p}{24}$

- **Indefinite integral:**
  $$\int\left(-\frac{1}{4}(4-p)\left(4-\frac{p}{3}\right)-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)\right)dp=-\frac{5p^3}{144}+p^2-8p+\text{constant}$$
- **Global maximum:**
  $$\max\left\{-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)-\frac{1}{4}\left(4-\frac{p}{3}\right)(4-p)\right\}=\frac{8}{5}\ \text{at}\ p=\frac{48}{5}$$
- **Definite integral:**
  $$\int_{\frac{8}{5}(6-\sqrt{6})}^{\frac{8}{5}(6+\sqrt{6})}\left(-\frac{1}{4}(4-p)\left(4-\frac{p}{3}\right)-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)\right)dp=\frac{256\sqrt{\frac{2}{3}}}{25}\approx 8.36092$$
- **Definite integral area above the axis between the smallest and largest real roots:**
  $$\int_{\frac{8}{5}(6-\sqrt{6})}^{\frac{8}{5}(6+\sqrt{6})}\left(-\frac{1}{4}(4-p)\left(4-\frac{p}{3}\right)-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)\right)$$
  $$\theta\left(-\frac{1}{4}(4-p)\left(4-\frac{p}{3}\right)-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)\right)dp=\frac{256\sqrt{\frac{2}{3}}}{25}\approx 8.36092$$

From:

$$p=\frac{48}{5}-\frac{8\sqrt{6}}{5}$$

$$p=\frac{48}{5}+\frac{8\sqrt{6}}{5}$$

we obtain:

Input:

$$\frac{48}{5}+\frac{1}{5}\left(8\sqrt{6}\right)$$

Result:

$$\frac{48}{5}+\frac{8\sqrt{6}}{5}$$

Decimal approximation:

13.519183588453084957115654519529426227145515969050672205 49...

-0.026+(((13.519183588453 -((((48/5 - (8 sqrt(6))/5)))))))^1/4

Input interpretation:

$$-0.026+\sqrt[4]{13.519183588453-\left(\frac{48}{5}-\frac{1}{5}\left(8\sqrt{6}\right)\right)}$$

Result:

1.6472329...

1.6472329… ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

2sqrt((((((((6(((((-0.026+(((13.519183588453 -((((48/5 - (8 sqrt(6))/5)))))))^1/4)))))))))))))

Input interpretation:

$$2\sqrt{6\left(-0.026+\sqrt[4]{13.519183588453-\left(\frac{48}{5}-\frac{1}{5}\left(8\sqrt{6}\right)\right)}\right)}$$

Result:

6.287574263072765298076033180839404428096188399290205928891...

6.28757426… ≈ 2π

From:

$$\int_{\frac{8}{5}\left(6-\sqrt{6}\right)}^{\frac{8}{5}\left(6+\sqrt{6}\right)}\left(-\frac{1}{4}(4-p)\left(4-\frac{p}{3}\right)-\frac{1}{2}(8-p)\left(1-\frac{p}{24}\right)\right)dp=\frac{256\sqrt{\frac{2}{3}}}{25}\approx 8.36092$$

Input:

$$\frac{1}{25}\left(256\sqrt{\frac{2}{3}}\right)$$

Result:

$$\frac{256\sqrt{\frac{2}{3}}}{25}$$

Decimal approximation:

8.3609249886999145751800629749961092845771007339747673717 16...

8.360924…

1/5 * (256 sqrt(2/3))/25

Input:

$$\frac{1}{5}\left(\frac{1}{25}\left(256\sqrt{\frac{2}{3}}\right)\right)$$

Result:

$$\frac{256\sqrt{\frac{2}{3}}}{125}$$

Decimal approximation:

1.6721849977399829150360125949992218569154201467949534743 43...

1.6721849977… result very near to the proton mass

And we also obtain:

1/2 * sqrt((((((((((((((256 sqrt(2/3))/25))))^8 + 196884))))))))

Input:

$$\frac{1}{2}\sqrt{\left(\frac{1}{25}\left(256\sqrt{\frac{2}{3}}\right)\right)^8+196\,884}$$

Result:

$$\frac{\sqrt{74\,395\,329\,108\,558\,909\,589}}{3\,515\,625}$$

Decimal approximation:

2453.4109006604764503627110300562516543229357653934061563 21...

2453.4109… result very near to the rest mass of charmed Sigma baryon 2452.9

From:

TWO-DIMENSIONAL SERIES EVALUATIONS VIA THE ELLIPTIC FUNCTIONS OF RAMANUJAN AND JACOBI

$$F_{(5,1)}(x) = -\frac{2\pi}{5x}\sum_{j=0}^{4}\cos\left(\frac{\pi(2j+1)}{5}\right)\log\prod_{m=0}^{\infty}\left(1-2\cos\left(\frac{\pi(2j+1)}{5}\right)q^{2m+1}+q^{4m+2}\right)$$
$$= -\frac{\pi}{5x}\log\frac{\chi(q^5)}{\chi^5(q)} - \frac{\pi}{\sqrt{5}x}\log\prod_{m \text{ odd}}\frac{1-\beta q^m+q^{2m}}{1-\alpha q^m+q^{2m}}, \tag{3.11}$$

where $\beta = \frac{1+\sqrt{5}}{2}$ and $\alpha = \frac{1-\sqrt{5}}{2}$.

$$\prod_{m \text{ odd}}\left(\frac{1-\beta q^m+q^{2m}}{1-\alpha q^m+q^{2m}}\right) = \sqrt[5]{\frac{(1-\alpha^5R^5(-q))\,(1-\beta^5R^5(q^2))}{(1-\beta^5R^5(-q))\,(1-\alpha^5R^5(q^2))}}. \tag{3.12}$$

from $q = e^{-\pi/2}$

we obtain: q = 0.2078795763507619

$$\prod_{n=0}^{\infty}\left(\frac{1+\sqrt{3}q^{2n+1}+q^{4n+2}}{1-\sqrt{3}q^{2n+1}+q^{4n+2}}\right) = \frac{-\varphi(-q^4)+3\varphi(-q^{36})+2\sqrt{3}qf(-q^{24})}{-\varphi(-q^4)+3\varphi(-q^{36})-2\sqrt{3}qf(-q^{24})}$$

product ((((((1+sqrt(3)*0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))/ ((((((1-sqrt(3)*(0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))), n= 0..3

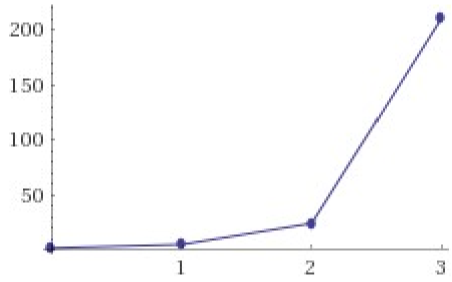
Product:

$$\prod_{n=0}^{3}\frac{0.2078795763507619^{4n+2}+1.3600579880954132^{2n+1}}{0.2078795763507619^{4n+2}-\sqrt{3}\ 0.2078795763507619^{2n+1}+1} =$$

210.415107116200

210.415107…

Partial products:



(21*2+3)+8 product ((((((1+sqrt(3)*0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))/ ((((((1-sqrt(3)*(0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))), n= 0..3

Input interpretation:

$$(21\times 2+3)+8\prod_{n=0}^{3}\frac{(1+\sqrt{3}\times 0.2078795763507619)^{2n+1}+0.2078795763507619^{4n+2}}{(1-\sqrt{3}\times 0.2078795763507619^{2n+1})+0.2078795763507619^{4n+2}}$$

Result:

1728.320856929601

1728.3208569...

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

((((((((product ((((((1+sqrt(3)*0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))/ ((((((1-sqrt(3)*(0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))), n= 0..3))))))))^1/(1.083581^30)

Where 1.083581 is very near to the mean of various Ramanujan mock theta functions. The mean is: 1,08344476

Input interpretation:

$$\sqrt[1.083581^{30}]{\prod_{n=0}^{3} \frac{(1+\sqrt{3}\times 0.2078795763507619)^{2n+1} + 0.2078795763507619^{4n+2}}{(1-\sqrt{3}\times 0.2078795763507619^{2n+1}) + 0.2078795763507619^{4n+2}}}$$

Result:

1.61822

1.61822 value practically equal to the result that is always obtained from the Ramanujan-Nardelli mock formula

Note that:

The sum of $\varphi(q) + \psi(q) + \chi(q) =$ **1.08663428** is very near to the index 1.0865845 of the root of the following formula

((((((((product ((((((1+sqrt(3)*0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))/ ((((((1-sqrt(3)*(0.2078795763507619)^(2n+1))+0.2078795763507619^(4n+2)))))), n= 0..3)))))))^1/(1.0865845^29)

Input interpretation:

$$\sqrt[1.0865845^{29}]{\prod_{n=0}^{3} \frac{(1+\sqrt{3}\times 0.2078795763507619)^{2n+1} + 0.2078795763507619^{4n+2}}{(1-\sqrt{3}\times 0.2078795763507619^{2n+1}) + 0.2078795763507619^{4n+2}}}$$

Result:

1.61822

1.61822

Now, we have that:

$$\sum_{n=-\infty}^{\infty}\sum_{m=-\infty}^{\infty} \frac{(-1)^{m+n}}{(5m)^2+(5n+1)^2} = -\frac{\pi}{5\sqrt{5}}\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right) + \frac{\pi}{25}\log\left(11+5\sqrt{5}\right),$$

-Pi/(((5sqrt(5)))) ((((((ln((((sqrt(5)+1-((sqrt(5+2sqrt(5))))))))))))) + ((((Pi/25 ln((11+5sqrt(5)))))))

Input:

$$-\frac{\pi}{5\sqrt{5}}\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)+\frac{\pi}{25}\log\left(11+5\sqrt{5}\right)$$

log(x) is the natural logarithm

Exact result:

$$\frac{1}{25}\pi\log\left(11+5\sqrt{5}\right)-\frac{\pi\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}$$

Decimal approximation:

0.907251234221684186681745047435660363351915408806459308595...

0.907251234…

Alternate form:

$$\frac{1}{25}\pi\left(\log\left(11+5\sqrt{5}\right)-\sqrt{5}\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)$$

Alternative representations:

$$\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi=\frac{1}{25}\pi\log(a)\log_a\left(11+5\sqrt{5}\right)-\frac{\pi\log(a)\log_a\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}$$

- $$\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi=\frac{1}{25}\pi\log_e\left(11+5\sqrt{5}\right)-\frac{\pi\log_e\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}$$

- $$\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi=-\frac{1}{25}\pi\,\text{Li}_1\left(-10-5\sqrt{5}\right)+\frac{\pi\,\text{Li}_1\left(-\sqrt{5}+\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi=$$

$$\frac{1}{25}\pi\log\left(11+5\sqrt{5}\right)+\frac{\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^k}{k}}{5\sqrt{5}}$$

((((1/ [[[-Pi/(((5sqrt(5)))) ((((((ln((((sqrt(5)+1-((sqrt(5+2sqrt(5)))))))))))))) + ((((Pi/25 ln((11+5sqrt(5)))))))]]])))))^5

Input:

$$\left(\frac{1}{-\frac{\pi}{5\sqrt{5}}\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)+\frac{\pi}{25}\log\left(11+5\sqrt{5}\right)}\right)^5$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{1}{\left(\frac{1}{25}\pi\log\left(11+5\sqrt{5}\right)-\frac{\pi\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}\right)^5}$$

Decimal approximation:

1.626904878955350032321762079924589891138940138331377555216...

1.626904878…

Alternate form:

$$\frac{9\,765\,625}{\pi^5\left(\log\left(11+5\sqrt{5}\right)-\sqrt{5}\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)^5}$$

Alternative representations:

$$\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$

$$\left(\frac{1}{\frac{1}{25}\pi\log_e\left(11+5\sqrt{5}\right)-\frac{\pi\log_e\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

- $$\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=\left(\frac{1}{\frac{1}{25}\pi\log(a)\log_a(11+5\sqrt{5})-\frac{\pi\log(a)\log_a\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$
- $$\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=\left(\frac{1}{-\frac{1}{25}\pi\,\mathrm{Li}_1(-10-5\sqrt{5})+\frac{\pi\,\mathrm{Li}_1\left(-\sqrt{5}+\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})+\frac{\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^k}{k}}{5\sqrt{5}}\right)^5}$$

-

$$\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5 = \frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})-\frac{\pi\sum_{j=1}^{\infty}\operatorname{Res}_{s=-j}\frac{\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}}{5\sqrt{5}}\right)^5}$$

$$\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5 = 9\,765\,625 \Big/ \left(\pi^5\left(2i\pi\left\lfloor\frac{\arg(11+5\sqrt{5}-x)}{2\pi}\right\rfloor-2i\sqrt{5}\,\pi\left\lfloor\frac{\arg\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)}{2\pi}\right\rfloor+\log(x)-\sqrt{5}\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(11+5\sqrt{5}-x)^k x^{-k}}{k}+\sqrt{5}\sum_{k=1}^{\infty}\frac{(-1)^k\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)^k x^{-k}}{k}\right)^5\right) \quad \text{for } x<0$$

$$\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi = \frac{2}{25}i\pi^2\left\lfloor\frac{\arg(11+5\sqrt{5}-x)}{2\pi}\right\rfloor-\frac{2i\pi^2\left\lfloor\frac{\arg\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{1}{25}\pi\log(x)-\frac{\pi\log(x)}{5\sqrt{5}}+\sum_{k=1}^{\infty}-\frac{(-1)^k\pi\left((11+5\sqrt{5}-x)^k-\sqrt{5}\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)^k\right)x^{-k}}{25k} \quad \text{for } x<0$$

-

$$\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi=$$

$$\frac{2}{25}i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor-\frac{2i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{1}{25}\pi\log(z_0)-\frac{\pi\log(z_0)}{5\sqrt{5}}+$$
$$\sum_{k=1}^{\infty}-\frac{(-1)^k\pi\left((11+5\sqrt{5}-z_0)^k-\sqrt{5}\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-z_0\right)^k\right)z_0^{-k}}{25k}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representation:

$$\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi=$$
$$\int_1^{11+5\sqrt{5}}\left(\frac{\pi}{25t}-\left(\left(-10-5\sqrt{5}\right)\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\pi\right)\Big/\left(5\sqrt{5}\left(10+5\sqrt{5}\right)\left(-10-4\sqrt{5}-\sqrt{5+2\sqrt{5}}+t-\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)t\right)\right)\right)dt$$

-8/10^3+((((1/ [[[-Pi/(((5sqrt(5)))) ((((((ln((((sqrt(5)+1-((sqrt(5+2sqrt(5)))))))))))))) + ((((Pi/25 ln((11+5sqrt(5)))))))]]])))))^5

Input:

$$-\frac{8}{10^3}+\left(\frac{1}{-\frac{\pi}{5\sqrt{5}}\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)+\frac{\pi}{25}\log(11+5\sqrt{5})}\right)^5$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})-\frac{\pi\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}\right)^5}-\frac{1}{125}$$

Decimal approximation:

1.618904878955350032321762079924589891138940138331377555216...

1.618904878…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternate forms:

$$\frac{9\,765\,625}{\pi^5\left(\log(11+5\sqrt{5})-\sqrt{5}\,\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)^5}-\frac{1}{125}$$

-

$$-\left(\left(-1\,220\,703\,125+\pi^5\log^5\left(11+5\sqrt{5}\right)-25\sqrt{5}\,\pi^5\log^5\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)-5\sqrt{5}\,\pi^5\log^4\left(11+5\sqrt{5}\right)\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)+125\,\pi^5\log\left(11+5\sqrt{5}\right)\log^4\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)+50\,\pi^5\log^3\left(11+5\sqrt{5}\right)\log^2\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)-50\sqrt{5}\,\pi^5\log^2\left(11+5\sqrt{5}\right)\log^3\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)\Big/\left(125\,\pi^5\left(\log\left(11+5\sqrt{5}\right)-\sqrt{5}\,\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)^5\right)\right)$$

Alternative representations:

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=$$

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{1}{25}\pi\log_e(11+5\sqrt{5})-\frac{\pi\log_e\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

-

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{1}{25}\pi\log(a)\log_a\left(11+5\sqrt{5}\right)-\frac{\pi\log(a)\log_a\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

-

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$

$$-\frac{8}{10^3}+\left(\frac{1}{-\frac{1}{25}\pi\,\mathrm{Li}_1\left(-10-5\sqrt{5}\right)+\frac{\pi\,\mathrm{Li}_1\left(-\sqrt{5}+\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations:

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$

$$-\frac{1}{125}+\frac{1}{\left(\frac{1}{25}\pi\log\left(11+5\sqrt{5}\right)+\frac{\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^k}{k}}{5\sqrt{5}}\right)^5}$$

-

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=$$

$$-\frac{1}{125}+\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})-\frac{\pi\sum_{j=1}^{\infty}\text{Res}_{s=-j}\frac{\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^{-s}\Gamma(-s)^2\Gamma(1+s)}{\Gamma(1-s)}}{5\sqrt{5}}\right)^5}$$

$$-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=-\frac{1}{125}+$$

$$1\Bigg/\left(\frac{1}{25}\pi\left(2i\pi\left\lfloor\frac{\arg(11+5\sqrt{5}-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(11+5\sqrt{5}-x)^k x^{-k}}{k}\right)-\right.$$

$$\frac{1}{5\sqrt{5}}\pi\left(2i\pi\left\lfloor\frac{\arg\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)}{2\pi}\right\rfloor+\log(x)-\right.$$

$$\left.\left.\sum_{k=1}^{\infty}\frac{(-1)^k\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)^k x^{-k}}{k}\right)\right)^5 \quad \text{for } x<0$$

34/10^3+8/10^3+3/10^3+((((1/ [[[-Pi/(((5sqrt(5)))) ((((((ln((((sqrt(5)+1-((sqrt(5+2sqrt(5)))))))))))))) + ((((Pi/25 ln((11+5sqrt(5)))))))]]]))))^5

Input:

$$\frac{34}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}+\left(\frac{1}{-\frac{\pi}{5\sqrt{5}}\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)+\frac{\pi}{25}\log(11+5\sqrt{5})}\right)^5$$

log(x) is the natural logarithm

Exact result:

$$\frac{9}{200}+\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})-\frac{\pi\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}\right)^5}$$

Decimal approximation:

1.671904878955350032321762079924589891138940138331377555216...

1.671904878…

We note that 1.671904878... is a result practically equal to the value of the formula:

$$m_{p'} = 2 \times \frac{\eta}{R} m_P = 1.6714213 \times 10^{-24} \text{ gm}$$

that is the holographic proton mass

Alternate forms:

$$\frac{9}{200} + \frac{9765625}{\pi^5 \left(\log(11 + 5\sqrt{5}) - \sqrt{5}\log\left(1 + \sqrt{5} - \sqrt{5 + 2\sqrt{5}}\right)\right)^5}$$

- $$\left(1953125000 + 9\pi^5 \log^5\left(11 + 5\sqrt{5}\right) - 225\sqrt{5}\,\pi^5 \log^5\left(1 + \sqrt{5} - \sqrt{5 + 2\sqrt{5}}\right) - 45\sqrt{5}\,\pi^5 \log^4\left(11 + 5\sqrt{5}\right)\log\left(1 + \sqrt{5} - \sqrt{5 + 2\sqrt{5}}\right) + 1125\,\pi^5 \log\left(11 + 5\sqrt{5}\right)\log^4\left(1 + \sqrt{5} - \sqrt{5 + 2\sqrt{5}}\right) + 450\,\pi^5 \log^3\left(11 + 5\sqrt{5}\right)\log^2\left(1 + \sqrt{5} - \sqrt{5 + 2\sqrt{5}}\right) - 450\sqrt{5}\,\pi^5 \log^2\left(11 + 5\sqrt{5}\right)\log^3\left(1 + \sqrt{5} - \sqrt{5 + 2\sqrt{5}}\right)\right) / \left(200\,\pi^5 \left(\log\left(11 + 5\sqrt{5}\right) - \sqrt{5}\log\left(1 + \sqrt{5} - \sqrt{5 + 2\sqrt{5}}\right)\right)^5\right)$$

Alternative representations:

$$\frac{34}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$

$$\frac{45}{10^3}+\left(\frac{1}{\frac{1}{25}\pi\log_e\left(11+5\sqrt{5}\right)-\frac{\pi\log_e\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

- $$\frac{34}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$

$$\frac{45}{10^3}+\left(\frac{1}{\frac{1}{25}\pi\log(a)\log_a\left(11+5\sqrt{5}\right)-\frac{\pi\log(a)\log_a\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

- $$\frac{34}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$

$$\frac{45}{10^3}+\left(\frac{1}{-\frac{1}{25}\pi\,\mathrm{Li}_1\left(-10-5\sqrt{5}\right)+\frac{\pi\,\mathrm{Li}_1\left(-\sqrt{5}+\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\frac{34}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=$$

$$\frac{9}{200}+\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})+\frac{\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^k}{k}}{5\sqrt{5}}\right)^5}$$

•

$$\frac{34}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=$$

$$\frac{9}{200}+\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})-\frac{\pi\sum_{j=1}^{\infty}\text{Res}_{s=-j}\frac{\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}}{5\sqrt{5}}\right)^5}$$

$$\frac{34}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=\frac{9}{200}+$$

$$1\Bigg/\left(\frac{1}{25}\pi\left(2i\pi\left\lfloor\frac{\arg(11+5\sqrt{5}-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(11+5\sqrt{5}-x)^k x^{-k}}{k}\right)-\right.$$

$$\frac{1}{5\sqrt{5}}\pi\left(2i\pi\left\lfloor\frac{\arg\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)}{2\pi}\right\rfloor+\log(x)-\right.$$

$$\left.\left.\sum_{k=1}^{\infty}\frac{(-1)^k\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)^k x^{-k}}{k}\right)\right)^5 \quad \text{for } x<0$$

$\Gamma(x)$ is the gamma function
$\underset{z=z_0}{\text{Res}}\, f$ is a complex residue

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

-34*2/10^5-8/10^3+((((1/ [[[-Pi/(((5sqrt(5)))) ((((((ln((((sqrt(5)+1-((sqrt(5+2sqrt(5))))))))))))))) + ((((Pi/25 ln((11+5sqrt(5)))))))]]])))))^5

Input:

$$-34\times\frac{2}{10^5}-\frac{8}{10^3}+\left(\frac{1}{-\frac{\pi}{5\sqrt{5}}\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)+\frac{\pi}{25}\log\left(11+5\sqrt{5}\right)}\right)^5$$

log(x) is the natural logarithm

Exact result:

$$\frac{1}{\left(\frac{1}{25}\pi\log\left(11+5\sqrt{5}\right)-\frac{\pi\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}\right)^5}-\frac{217}{25000}$$

Decimal approximation:

1.618224878955350032321762079924589891138940138331377555216...

1.618224878… value practically equal to the result that is always obtained from the Ramanujan-Nardelli mock formula

Alternate forms:

$$\frac{9765625}{\pi^5\left(\log\left(11+5\sqrt{5}\right)-\sqrt{5}\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)^5}-\frac{217}{25000}$$

- $$-\left(\left(-244140625000+217\pi^5\log^5\left(11+5\sqrt{5}\right)-5425\sqrt{5}\pi^5\log^5\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)-1085\sqrt{5}\pi^5\log^4\left(11+5\sqrt{5}\right)\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)+27125\pi^5\log\left(11+5\sqrt{5}\right)\log^4\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)+10850\pi^5\log^3\left(11+5\sqrt{5}\right)\log^2\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)-10850\sqrt{5}\pi^5\log^2\left(11+5\sqrt{5}\right)\log^3\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)\Big/\left(25000\pi^5\left(\log\left(11+5\sqrt{5}\right)-\sqrt{5}\log\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)\right)^5\right)\right)$$

Alternative representations:

$$-\frac{34\times 2}{10^5}-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$
$$-\frac{8}{10^3}-\frac{68}{10^5}+\left(\frac{1}{\frac{1}{25}\pi\log_e\left(11+5\sqrt{5}\right)-\frac{\pi\log_e\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

-

$$-\frac{34\times 2}{10^5}-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$
$$-\frac{8}{10^3}-\frac{68}{10^5}+\left(\frac{1}{\frac{1}{25}\pi\log(a)\log_a\left(11+5\sqrt{5}\right)-\frac{\pi\log(a)\log_a\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

-

$$-\frac{34\times 2}{10^5}-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log\left(11+5\sqrt{5}\right)\pi}\right)^5=$$
$$-\frac{8}{10^3}-\frac{68}{10^5}+\left(\frac{1}{-\frac{1}{25}\pi\operatorname{Li}_1\left(-10-5\sqrt{5}\right)+\frac{\pi\operatorname{Li}_1\left(-\sqrt{5}+\sqrt{5+2\sqrt{5}}\right)}{5\sqrt{5}}}\right)^5$$

$\log_b(x)$ is the base- b logarithm

$\operatorname{Li}_n(x)$ is the polylogarithm function

Series representations:

$$-\frac{34\times 2}{10^5}-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=$$

$$-\frac{217}{25000}+\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})+\frac{\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^k}{k}}{5\sqrt{5}}\right)^5}$$

-

$$-\frac{34\times 2}{10^5}-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=$$

$$-\frac{217}{25000}+\frac{1}{\left(\frac{1}{25}\pi\log(11+5\sqrt{5})-\frac{\pi\sum_{j=1}^{\infty}\operatorname{Res}_{s=-j}\frac{\left(\sqrt{5}-\sqrt{5+2\sqrt{5}}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}}{5\sqrt{5}}\right)^5}$$

$$-\frac{34\times 2}{10^5}-\frac{8}{10^3}+\left(\frac{1}{\frac{\log\left(\sqrt{5}+1-\sqrt{5+2\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{25}\log(11+5\sqrt{5})\pi}\right)^5=-\frac{217}{25000}+$$

$$1\Bigg/\left(\frac{1}{25}\pi\left(2i\pi\left\lfloor\frac{\arg(11+5\sqrt{5}-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(11+5\sqrt{5}-x)^k x^{-k}}{k}\right)-\right.$$

$$\frac{1}{5\sqrt{5}}\pi\left(2i\pi\left\lfloor\frac{\arg\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)}{2\pi}\right\rfloor+\log(x)-\right.$$

$$\left.\left.\sum_{k=1}^{\infty}\frac{(-1)^k\left(1+\sqrt{5}-\sqrt{5+2\sqrt{5}}-x\right)^k x^{-k}}{k}\right)\right)^5 \quad \text{for } x<0$$

$\Gamma(x)$ is the gamma function
$\operatorname{Res}_{z=z_0} f$ is a complex residue

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

We have that:

$$\sum_{n=-\infty}^{\infty} \sum_{m=-\infty}^{\infty} \frac{(-1)^{m+n}}{m^2+(3n+1)^2} = \frac{2\pi}{9} \log\left(2(\sqrt{3}-1)\right). \tag{3.16}$$

(2Pi)/9 * ln(((2((sqrt(3))-1)))))

Input:

$$\frac{2\pi}{9} \log\left(2\left(\sqrt{3}-1\right)\right)$$

log(x) is the natural logarithm

Exact result:

$$\frac{2}{9} \pi \log\left(2\left(\sqrt{3}-1\right)\right)$$

Decimal approximation:

0.2661570018716375625964155124465796897262179993951277557 12...

0.266157001…

Alternate forms:

$$\frac{2}{9} \pi \log\left(2\sqrt{3}-2\right)$$

- $$\frac{2}{9} \pi \left(\log(2)+\log\left(\sqrt{3}-1\right)\right)$$

- $$\frac{2}{9} \pi \log(2)+\frac{2}{9} \pi \log\left(\sqrt{3}-1\right)$$

Alternative representations:

$$\frac{1}{9} \log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = \frac{2}{9} \pi \log_e\left(2\left(-1+\sqrt{3}\right)\right)$$

- $$\frac{1}{9} \log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = \frac{2}{9} \pi \log(a) \log_a\left(2\left(-1+\sqrt{3}\right)\right)$$

- $$\frac{1}{9} \log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = -\frac{2}{9} \pi \operatorname{Li}_1\left(1-2\left(-1+\sqrt{3}\right)\right)$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\frac{1}{9}\log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = -\frac{2}{9}\pi\sum_{k=1}^{\infty}\frac{\left(3-2\sqrt{3}\right)^k}{k}$$

-

$$\frac{1}{9}\log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = \frac{4}{9}i\pi^2\left\lfloor\frac{\arg\left(-2+2\sqrt{3}-x\right)}{2\pi}\right\rfloor + \frac{2}{9}\pi\log(x) - \frac{2}{9}\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-x\right)^k x^{-k}}{k} \quad \text{for } x<0$$

-

$$\frac{1}{9}\log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = \frac{4}{9}i\pi^2\left\lfloor\frac{\arg\left(2\left(-1+\sqrt{3}\right)-x\right)}{2\pi}\right\rfloor + \frac{2}{9}\pi\log(x) - \frac{2}{9}\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-x\right)^k x^{-k}}{k} \quad \text{for } x<0$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$\frac{1}{9}\log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = \frac{2\pi}{9}\int_1^{2\left(-1+\sqrt{3}\right)}\frac{1}{t}\,dt$$

-

$$\frac{1}{9}\log\left(2\left(\sqrt{3}-1\right)\right)(2\pi) = -\frac{i}{9}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-3+2\sqrt{3}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

2Pi*((((2Pi)/9 * ln(((2((sqrt(3))-1)))))))

Input:

$$2\pi\left(\frac{2\pi}{9}\log\left(2\left(\sqrt{3}-1\right)\right)\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{4}{9}\pi^2\log\left(2\left(\sqrt{3}-1\right)\right)$$

Decimal approximation:

1.672313763562842831610215064545991567768155269407311681966...

1.672313763… result very near to the proton mass

Alternate forms:

$$\frac{4}{9}\pi^2\log\left(2\sqrt{3}-2\right)$$

- $$\frac{4}{9}\pi^2\left(\log(2)+\log\left(\sqrt{3}-1\right)\right)$$

- $$\frac{4}{9}\pi^2\log(2)+\frac{4}{9}\pi^2\log\left(\sqrt{3}-1\right)$$

Alternative representations:

$$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=\frac{4}{9}\pi^2\log_e\left(2\left(-1+\sqrt{3}\right)\right)$$

- $$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=\frac{4}{9}\pi^2\log(a)\log_a\left(2\left(-1+\sqrt{3}\right)\right)$$

- $$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{4}{9}\pi^2\operatorname{Li}_1\left(1-2\left(-1+\sqrt{3}\right)\right)$$

$\log_b(x)$ is the base- b logarithm

$\operatorname{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{4}{9}\pi^2\sum_{k=1}^{\infty}\frac{\left(3-2\sqrt{3}\right)^k}{k}$$

- $$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)= \frac{4}{9}\pi^2\left(\log(z_0)+\left\lfloor\frac{\arg(-2+2\sqrt{3}-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-z_0\right)^k z_0^{-k}}{k}\right)$$

- $$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)= \frac{4}{9}\pi^2\left(\log(z_0)+\left\lfloor\frac{\arg(2(-1+\sqrt{3})-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-z_0\right)^k z_0^{-k}}{k}\right)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=\frac{4\pi^2}{9}\int_1^{2\left(-1+\sqrt{3}\right)}\frac{1}{t}\,dt$$

- $$\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{2i\pi}{9}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-3+2\sqrt{3}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds$$ for $-1<\gamma<0$

$\Gamma(x)$ is the gamma function

(-21/10^3-8/10^3) + 2Pi*((((2Pi)/9 * ln(((2((sqrt(3))-1)))))))

Input:

$$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+2\pi\left(\frac{2\pi}{9}\log\left(2\left(\sqrt{3}-1\right)\right)\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{4}{9}\pi^2\log\left(2\left(\sqrt{3}-1\right)\right)-\frac{29}{1000}$$

Decimal approximation:

1.643313763562842831610215064545991567768155269407311681966...

$1.64331376\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms:

$$\frac{4}{9}\pi^2\log\left(2\sqrt{3}-2\right)-\frac{29}{1000}$$

- $$\frac{4000\pi^2\log(2(\sqrt{3}-1))-261}{9000}$$

- $$\frac{4}{9}\pi^2\left(\log(2)+\log\left(\sqrt{3}-1\right)\right)-\frac{29}{1000}$$

Alternative representations:

$$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=\frac{4}{9}\pi^2\log_e\left(2\left(-1+\sqrt{3}\right)\right)-\frac{29}{10^3}$$

- $$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=\frac{4}{9}\pi^2\log(a)\log_a\left(2\left(-1+\sqrt{3}\right)\right)-\frac{29}{10^3}$$

- $$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{4}{9}\pi^2\operatorname{Li}_1\left(1-2\left(-1+\sqrt{3}\right)\right)-\frac{29}{10^3}$$

$\log_b(x)$ is the base- b logarithm

$\operatorname{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{29}{1000}-\frac{4}{9}\pi^2\sum_{k=1}^{\infty}\frac{\left(3-2\sqrt{3}\right)^k}{k}$$

•

$$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{29}{1000}+\frac{8}{9}i\pi^3\left\lfloor\frac{\arg\left(-2+2\sqrt{3}-x\right)}{2\pi}\right\rfloor+\frac{4}{9}\pi^2\log(x)-\frac{4}{9}\pi^2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

•

$$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{29}{1000}+\frac{8}{9}i\pi^3\left\lfloor\frac{\arg\left(2\left(-1+\sqrt{3}\right)-x\right)}{2\pi}\right\rfloor+\frac{4}{9}\pi^2\log(x)-\frac{4}{9}\pi^2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{29}{1000}+\frac{4\pi^2}{9}\int_1^{2\left(-1+\sqrt{3}\right)}\frac{1}{t}\,dt$$

•

$$\left(-\frac{21}{10^3}-\frac{8}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{29}{1000}-\frac{2i\pi}{9}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-3+2\sqrt{3}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

(-55/10^3+1/10^3) + 2Pi*((((2Pi)/9 * ln(((2((sqrt(3))-1)))))))

Input:

$$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+2\pi\left(\frac{2\pi}{9}\log\left(2\left(\sqrt{3}-1\right)\right)\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{4}{9}\pi^2\log\left(2\left(\sqrt{3}-1\right)\right)-\frac{27}{500}$$

Decimal approximation:

1.618313763562842831610215064545991567768155269407311681966...

1.618313763…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternate forms:

$$\frac{4}{9}\pi^2\log\left(2\sqrt{3}-2\right)-\frac{27}{500}$$

- $$\frac{2000\pi^2\log(2(\sqrt{3}-1))-243}{4500}$$

- $$\frac{4}{9}\pi^2\left(\log(2)+\log\left(\sqrt{3}-1\right)\right)-\frac{27}{500}$$

Alternative representations:

$$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=\frac{4}{9}\pi^2\log_e\left(2\left(-1+\sqrt{3}\right)\right)-\frac{54}{10^3}$$

- $$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=\frac{4}{9}\pi^2\log(a)\log_a\left(2\left(-1+\sqrt{3}\right)\right)-\frac{54}{10^3}$$

- $$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{4}{9}\pi^2\operatorname{Li}_1\left(1-2\left(-1+\sqrt{3}\right)\right)-\frac{54}{10^3}$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{27}{500}-\frac{4}{9}\pi^2\sum_{k=1}^{\infty}\frac{\left(3-2\sqrt{3}\right)^k}{k}$$

•

$$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{27}{500}+\frac{8}{9}i\pi^3\left\lfloor\frac{\arg\left(-2+2\sqrt{3}-x\right)}{2\pi}\right\rfloor+\frac{4}{9}\pi^2\log(x)-\frac{4}{9}\pi^2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

•

$$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{27}{500}+\frac{8}{9}i\pi^3\left\lfloor\frac{\arg\left(2\left(-1+\sqrt{3}\right)-x\right)}{2\pi}\right\rfloor+\frac{4}{9}\pi^2\log(x)-\frac{4}{9}\pi^2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-2+2\sqrt{3}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{27}{500}+\frac{4\pi^2}{9}\int_1^{2\left(-1+\sqrt{3}\right)}\frac{1}{t}\,dt$$

•

$$\left(-\frac{55}{10^3}+\frac{1}{10^3}\right)+\frac{1}{9}(2\pi)(2\pi)\log\left(2\left(\sqrt{3}-1\right)\right)=-\frac{27}{500}-\frac{2i\pi}{9}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-3+2\sqrt{3}\right)^{-s}\Gamma(-s)^2\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

Now, we have that:

$$\sum_{n=-\infty}^{\infty} \sum_{m=-\infty}^{\infty} \frac{(-1)^{m+n}}{m^2 + (5n+1)^2} = -\frac{\pi}{5\sqrt{5}} \log\left(-19 + 9\sqrt{5} - 3\sqrt{85 - 38\sqrt{5}}\right) + \frac{\pi}{5} \log\left(\sqrt{5} - 1\right). \tag{3.20}$$

-Pi/(5sqrt(5)) * ln(((((((-19+9sqrt(5)-3sqrt((85-38sqrt(5))))))))))) + Pi/5 * ln(sqrt(5)-1))

Input:

$$-\frac{\pi}{5\sqrt{5}} \log\left(-19 + 9\sqrt{5} - 3\sqrt{85 - 38\sqrt{5}}\right) + \frac{\pi}{5} \log\left(\sqrt{5} - 1\right)$$

log(x) is the natural logarithm

Exact result:

$$\frac{1}{5}\pi \log\left(\sqrt{5} - 1\right) - \frac{\pi \log\left(-19 + 9\sqrt{5} - 3\sqrt{85 - 38\sqrt{5}}\right)}{5\sqrt{5}}$$

Decimal approximation:

0.272023570258155108331808146071177092228774189325356105569...

0.27202357…

Alternate form:

$$\frac{1}{25}\pi\left(5\log\left(\sqrt{5} - 1\right) - \sqrt{5}\log\left(-19 + 9\sqrt{5} - 3\sqrt{85 - 38\sqrt{5}}\right)\right)$$

Alternative representations:

$$\frac{\log\left(-19 + 9\sqrt{5} - 3\sqrt{85 - 38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}} + \frac{1}{5}\log\left(\sqrt{5} - 1\right)\pi = \frac{1}{5}\pi\log(a)\log_a\left(-1 + \sqrt{5}\right) - \frac{\pi\log(a)\log_a\left(-19 + 9\sqrt{5} - 3\sqrt{85 - 38\sqrt{5}}\right)}{5\sqrt{5}}$$

-

$$\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi = \frac{1}{5}\pi\log_e\left(-1+\sqrt{5}\right)-\frac{\pi\log_e\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}$$

- $$\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi = -\frac{1}{5}\pi\operatorname{Li}_1\left(2-\sqrt{5}\right)+\frac{\pi\operatorname{Li}_1\left(20-9\sqrt{5}+3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}$$

$\log_b(x)$ is the base- b logarithm

$\operatorname{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi = \sum_{k=1}^{\infty}-\frac{(-1)^k\left(5\left(-2+\sqrt{5}\right)^k-\sqrt{5}\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)^k\right)\pi}{25k}$$

- $$\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi = \sum_{k=1}^{\infty}\left(\frac{(-1)^{-1+k}\left(-2+\sqrt{5}\right)^k\pi}{5k}-\frac{(-1)^{-1+k}\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)^k\pi}{5\sqrt{5}\,k}\right)$$

-

$$\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi = \frac{2}{5}i\pi^2\left\lfloor\frac{\arg(-1+\sqrt{5}-x)}{2\pi}\right\rfloor - \frac{2i\pi^2\left\lfloor\frac{\arg\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{1}{5}\pi\log(x)-\frac{\pi\log(x)}{5\sqrt{5}}+\sum_{k=1}^{\infty}-\frac{(-1)^k\pi\left(5(-1+\sqrt{5}-x)^k-\sqrt{5}\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)^k\right)x^{-k}}{25k} \quad \text{for } x<0$$

arg(z) is the complex argument

⌊x⌋ is the floor function

Integral representation:

$$\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi = \int_1^{-1+\sqrt{5}}\left(\frac{\pi}{5t}-\left(\left(2-\sqrt{5}\right)\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\pi\right)\Big/\left(5\sqrt{5}\left(-2+\sqrt{5}\right)\left(-18+8\sqrt{5}-3\sqrt{85-38\sqrt{5}}+t-\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)t\right)\right)\right)dt$$

13/10^3 + 6(((((((-Pi/(5sqrt(5)) * ln(((((((-19+9sqrt(5)-3sqrt((85-38sqrt(5)))))))))) + Pi/5 * ln(sqrt(5)-1))))))))

Input:

$$\frac{13}{10^3}+6\left(-\frac{\pi}{5\sqrt{5}}\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)+\frac{\pi}{5}\log\left(\sqrt{5}-1\right)\right)$$

log(x) is the natural logarithm

Exact result:

$$\frac{13}{1000}+6\left(\frac{1}{5}\pi\log\left(\sqrt{5}-1\right)-\frac{\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

Decimal approximation:

1.645141421548930649990848876427062553372645135952136633416...

1.6451414215… ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934...$

Alternate forms:

$$\frac{13+1200\pi\log(\sqrt{5}-1)-240\sqrt{5}\,\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{1000}$$

- $$\frac{13}{1000}+\frac{6}{5}\pi\log\left(\sqrt{5}-1\right)-\frac{6\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}$$

- $$\frac{13}{1000}+\frac{6}{25}\pi\left(5\log\left(\sqrt{5}-1\right)-\sqrt{5}\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\right)$$

Alternative representations:

$$\frac{13}{10^3}+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$
$$\frac{13}{10^3}+6\left(\frac{1}{5}\pi\log(a)\log_a\left(-1+\sqrt{5}\right)-\frac{\pi\log(a)\log_a\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

-

$$\frac{13}{10^3}+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$\frac{13}{10^3}+6\left(\frac{1}{5}\pi\log_e\left(-1+\sqrt{5}\right)-\frac{\pi\log_e\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

•

$$\frac{13}{10^3}+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$\frac{13}{10^3}+6\left(-\frac{1}{5}\pi\,\mathrm{Li}_1\left(2-\sqrt{5}\right)+\frac{\pi\,\mathrm{Li}_1\left(20-9\sqrt{5}+3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\frac{13}{10^3}+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$\frac{13}{1000}+\sum_{k=1}^{\infty}-\frac{6(-1)^k\left(5\left(-2+\sqrt{5}\right)^k-\sqrt{5}\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)^k\right)\pi}{25\,k}$$

•

$$\frac{13}{10^3}+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$\frac{13}{1000}+\frac{12}{5}i\pi^2\left\lfloor\frac{\arg(-1+\sqrt{5}-x)}{2\pi}\right\rfloor-\frac{12i\pi^2\left\lfloor\frac{\arg\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{6}{5}\pi\log(x)-\frac{6\pi\log(x)}{5\sqrt{5}}+\sum_{k=1}^{\infty}-\frac{6(-1)^k\pi\left(5(-1+\sqrt{5}-x)^k-\sqrt{5}\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)^k\right)x^{-k}}{25k}$$

for $x < 0$

- $$\frac{13}{10^3}+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$\frac{13}{1000}+\frac{12}{5}i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor-\frac{12i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{6}{5}\pi\log(z_0)-\frac{6\pi\log(z_0)}{5\sqrt{5}}+\sum_{k=1}^{\infty}-\frac{6(-1)^k\pi\left(5(-1+\sqrt{5}-z_0)^k-\sqrt{5}\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-z_0\right)^k\right)z_0^{-k}}{25k}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representation:

$$\frac{13}{10^3}+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$\frac{13}{1000}+\int_1^{-1+\sqrt{5}}\left(\frac{6\pi}{5t}-\left(6\left(2-\sqrt{5}\right)\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\pi\right)\Big/\left(5\sqrt{5}\left(-2+\sqrt{5}\right)\left(-18+8\sqrt{5}-3\sqrt{85-38\sqrt{5}}+t-\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)t\right)\right)\right)dt$$

(5/10^3+13/10^3+21/10^3) + 6(((((((-Pi/(5sqrt(5)) * ln(((((((-19+9sqrt(5)-3sqrt((85-38sqrt(5)))))))))) + Pi/5 * ln(sqrt(5)-1))))))))

Input:

$$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(-\frac{\pi}{5\sqrt{5}}\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)+\frac{\pi}{5}\log\left(\sqrt{5}-1\right)\right)$$

log(x) is the natural logarithm

Exact result:

$$\frac{39}{1000}+6\left(\frac{1}{5}\pi\log\left(\sqrt{5}-1\right)-\frac{\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

Decimal approximation:

1.671141421548930649990848876427062553372645135952136633416...

1.67114142154…

We note that 1.67114142154... is a result practically equal to the value of the formula:

$$m_{p'}=2\times\frac{\eta}{R}m_P=1.6714213\times10^{-24}\text{ gm}$$

that is the holographic proton mass

Alternate forms:

$$\frac{3\left(13+400\,\pi\log(\sqrt{5}-1)-80\sqrt{5}\,\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\right)}{1000}$$

- $$\frac{39}{1000}+\frac{6}{5}\pi\log\left(\sqrt{5}-1\right)-\frac{6\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}$$

- $$\frac{6}{5}\pi\log\left(\sqrt{5}-1\right)-\frac{3\left(80\sqrt{5}\,\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)-13\right)}{1000}$$

Alternative representations:

$$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$
$$\frac{39}{10^3}+6\left(\frac{1}{5}\pi\log(a)\log_a\left(-1+\sqrt{5}\right)-\frac{\pi\log(a)\log_a\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

- $$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$
$$\frac{39}{10^3}+6\left(\frac{1}{5}\pi\log_e\left(-1+\sqrt{5}\right)-\frac{\pi\log_e\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

- $$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$
$$\frac{39}{10^3}+6\left(-\frac{1}{5}\pi\,\mathrm{Li}_1\left(2-\sqrt{5}\right)+\frac{\pi\,\mathrm{Li}_1\left(20-9\sqrt{5}+3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$
$$\frac{39}{1000}+\sum_{k=1}^{\infty}-\frac{6(-1)^k\left(5\left(-2+\sqrt{5}\right)^k-\sqrt{5}\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)^k\right)\pi}{25k}$$

•

$$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$
$$\frac{39}{1000}+\frac{12}{5}i\pi^2\left\lfloor\frac{\arg\left(-1+\sqrt{5}-x\right)}{2\pi}\right\rfloor-$$
$$\frac{12i\pi^2\left\lfloor\frac{\arg\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{6}{5}\pi\log(x)-\frac{6\pi\log(x)}{5\sqrt{5}}+$$
$$\sum_{k=1}^{\infty}-\frac{6(-1)^k\pi\left(5\left(-1+\sqrt{5}-x\right)^k-\sqrt{5}\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)^k\right)x^{-k}}{25k}$$
for $x<0$

•

$$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$
$$\frac{39}{1000}+\frac{12}{5}i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor-$$
$$\frac{12i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{6}{5}\pi\log(z_0)-\frac{6\pi\log(z_0)}{5\sqrt{5}}+$$
$$\sum_{k=1}^{\infty}-\frac{6(-1)^k\pi\left(5\left(-1+\sqrt{5}-z_0\right)^k-\sqrt{5}\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-z_0\right)^k\right)z_0^{-k}}{25k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Integral representation:

$$\left(\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$\frac{39}{1000}+\int_1^{-1+\sqrt{5}}\left(\frac{6\pi}{5t}-\left(6\left(2-\sqrt{5}\right)\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\pi\right)\Big/\left(5\sqrt{5}\left(-2+\sqrt{5}\right)\left(-18+8\sqrt{5}-3\sqrt{85-38\sqrt{5}}+t-\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)t\right)\right)\right)dt$$

(2/10^3+5/10^3+13/10^3+21/10^3-55/10^3) + 6(((((((-Pi/(5sqrt(5)) * ln(((((((-19+9sqrt(5)-3sqrt((85-38sqrt(5)))))))))) + Pi/5 * ln(sqrt(5)-1))))))))

Input:

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(-\frac{\pi}{5\sqrt{5}}\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)+\frac{\pi}{5}\log\left(\sqrt{5}-1\right)\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$6\left(\frac{1}{5}\pi\log\left(\sqrt{5}-1\right)-\frac{\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)-\frac{7}{500}$$

Decimal approximation:

1.618141421548930649990848876427062553372645135952136633416...

1.61814142154…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternate forms:

$$\frac{1}{500}\left(-7+600\,\pi\log\left(\sqrt{5}-1\right)-120\sqrt{5}\,\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\right)$$

-

$$-\frac{7}{500}+\frac{6}{5}\,\pi\log\left(\sqrt{5}-1\right)-\frac{6\,\pi\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}$$

-

$$\frac{6}{25}\,\pi\left(5\log\left(\sqrt{5}-1\right)-\sqrt{5}\,\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\right)-\frac{7}{500}$$

Alternative representations:

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=-\frac{14}{10^3}+6\left(\frac{1}{5}\,\pi\log(a)\log_a\left(-1+\sqrt{5}\right)-\frac{\pi\log(a)\log_a\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

-

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=-\frac{14}{10^3}+6\left(\frac{1}{5}\,\pi\log_e\left(-1+\sqrt{5}\right)-\frac{\pi\log_e\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

-

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$-\frac{14}{10^3}+6\left(-\frac{1}{5}\pi\,\mathrm{Li}_1\left(2-\sqrt{5}\right)+\frac{\pi\,\mathrm{Li}_1\left(20-9\sqrt{5}+3\sqrt{85-38\sqrt{5}}\right)}{5\sqrt{5}}\right)$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$-\frac{7}{500}+\sum_{k=1}^{\infty}-\frac{6(-1)^k\left(5\left(-2+\sqrt{5}\right)^k-\sqrt{5}\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)^k\right)\pi}{25k}$$

-

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$-\frac{7}{500}+\frac{12}{5}i\pi^2\left\lfloor\frac{\arg\left(-1+\sqrt{5}-x\right)}{2\pi}\right\rfloor-\frac{12i\pi^2\left\lfloor\frac{\arg\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{6}{5}\pi\log(x)-\frac{6\pi\log(x)}{5\sqrt{5}}+\sum_{k=1}^{\infty}-\frac{6(-1)^k\pi\left(5\left(-1+\sqrt{5}-x\right)^k-\sqrt{5}\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-x\right)^k\right)x^{-k}}{25k}$$

for $x<0$

-

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$-\frac{7}{500}+\frac{12}{5}i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor-\frac{12i\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor}{5\sqrt{5}}+\frac{6}{5}\pi\log(z_0)-\frac{6\pi\log(z_0)}{5\sqrt{5}}+\sum_{k=1}^{\infty}-\frac{6(-1)^k\pi\left(5\left(-1+\sqrt{5}-z_0\right)^k-\sqrt{5}\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}-z_0\right)^k\right)z_0^{-k}}{25k}$$

arg(z) is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representation:

$$\left(\frac{2}{10^3}+\frac{5}{10^3}+\frac{13}{10^3}+\frac{21}{10^3}-\frac{55}{10^3}\right)+6\left(\frac{\log\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)(-\pi)}{5\sqrt{5}}+\frac{1}{5}\log\left(\sqrt{5}-1\right)\pi\right)=$$

$$-\frac{7}{500}+\int_1^{-1+\sqrt{5}}\left(\frac{6\pi}{5t}-\left(6\left(2-\sqrt{5}\right)\left(-20+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)\pi\right)\Big/\left(5\sqrt{5}\left(-2+\sqrt{5}\right)\left(-18+8\sqrt{5}-3\sqrt{85-38\sqrt{5}}+t-\left(-19+9\sqrt{5}-3\sqrt{85-38\sqrt{5}}\right)t\right)\right)\right)dt$$

Now, we have that:

$$\frac{5}{\pi}\sum_{n=-\infty}^{\infty}\sum_{m=-\infty}^{\infty}\frac{(-1)^{n+m}}{m^2+(10n+1)^2} - \sqrt{\frac{5-\sqrt{5}}{2}}\log(d_1) - \sqrt{\frac{5+\sqrt{5}}{2}}\log(d_3) - \frac{\sqrt{5\quad 2\sqrt{5}}}{4}\log 2, \qquad (4.8)$$

where

$$d_1 = \mathrm{dn}(K/10) \approx 0.9915\ldots, \qquad d_3 = \mathrm{dn}(3K/10) \approx 0.9309\ldots.$$

sqrt(((5-sqrt(5))/2))*ln(0.9915)- sqrt(((5+sqrt(5))/2))*ln(0.9309) – 1/4 *sqrt(((5)-2sqrt(5)))*ln(2)

Input:

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915) - \sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309) - \frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)$$

log(x) is the natural logarithm

Result:

0.000262511...

0.000262511…

Alternative representations:

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915) - \sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309) - \frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2) = -\frac{1}{4}\log(a)\log_a(2)\sqrt{5-2\sqrt{5}} + \log(a)\log_a(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)} - \log(a)\log_a(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}$$

•

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915) - \sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309) - \frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2) = -\frac{1}{4}\log_e(2)\sqrt{5-2\sqrt{5}} + \log_e(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)} - \log_e(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}$$

•

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\,\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\,\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\,\log(2)=$$
$$\frac{1}{4}\,\text{Li}_1(-1)\sqrt{5-2\sqrt{5}}-\text{Li}_1(0.0085)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}+\text{Li}_1(0.0691)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\,\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\,\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\,\log(2)=$$
$$\sum_{k=0}^{\infty}\left(-\frac{(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(5-x-2\sqrt{5}\right)}{2\pi}\right\rfloor\right)\log(2)\left(-\frac{1}{2}\right)_k\left(5-x-2\sqrt{5}\right)^k\sqrt{x}}{4\,k!}+\right.$$
$$\frac{\left(-\frac{1}{2}\right)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5}{2}-x-\frac{\sqrt{5}}{2}\right)}{2\pi}\right\rfloor\right)\log(0.9915)\left(-\frac{1}{2}\right)_k\left(5-2x-\sqrt{5}\right)^k\sqrt{x}}{k!}+$$
$$\frac{1}{k!}(-1)^{1+k}\,2^{-k}x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1}{2}\left(5-2x+\sqrt{5}\right)\right)}{2\pi}\right\rfloor\right)\log(0.9309)$$
$$\left.\left(-\frac{1}{2}\right)_k\left(5-2x+\sqrt{5}\right)^k\sqrt{x}\right)\quad\text{for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)=$$

$$\sum_{k=0}^{\infty}\left(\frac{(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}\left(5-\sqrt{5}\right)\right)}{2\pi}\right\rfloor\right)\log(0.9915)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5-\sqrt{5}\right)\right)^k\sqrt{x}}{k!}-\frac{(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(5-x-2\sqrt{5}\right)}{2\pi}\right\rfloor\right)\log(2)\left(-\frac{1}{2}\right)_k\left(5-x-2\sqrt{5}\right)^k\sqrt{x}}{4k!}+\frac{1}{k!}(-1)^{1+k}x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}\left(5+\sqrt{5}\right)\right)}{2\pi}\right\rfloor\right)\log(0.9309)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5+\sqrt{5}\right)\right)^k\sqrt{x}\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)=$$

$$\sum_{k=0}^{\infty}\left(\frac{1}{k!}(-1)^k\log(0.9915)\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}z_0^{-k+1/2\left(1+\left\lfloor\arg\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor\right)}-\frac{1}{4k!}(-1)^k\log(2)\left(-\frac{1}{2}\right)_k\left(5-2\sqrt{5}-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(5-2\sqrt{5}-z_0\right)/(2\pi)\right\rfloor}z_0^{-k+1/2\left(1+\left\lfloor\arg\left(5-2\sqrt{5}-z_0\right)/(2\pi)\right\rfloor\right)}+\frac{1}{k!}(-1)^{1+k}\log(0.9309)\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}z_0^{-k+1/2\left(1+\left\lfloor\arg\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor\right)}\right)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial) *i* is the imaginary unit

ℝ is the set of real numbers

-3/10^3+1/((((((sqrt(((5-sqrt(5))/2))*ln(0.9915)- sqrt(((5+sqrt(5))/2))*ln(0.9309) – 1/4 *sqrt(((5)-2sqrt(5)))*ln(2)))))))^1/16

Input:

$$-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

log(*x*) is the natural logarithm

Result:

1.6711843562370798473216542712943811858736676835077879593 50...

1.671184356…

We note that 1.671184356... is a result practically equal to the value of the formula:

$$m_{p\prime}=2\times\frac{\eta}{R}m_P=1.6714213\times10^{-2}\ \text{gm}$$

that is the holographic proton mass

Alternative representations:

$$-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$
$$=-\frac{3}{10^3}+1\Big/\left(\left(-\frac{1}{4}\log_e(2)\sqrt{5-2\sqrt{5}}+\log_e(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\log_e(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\hat{}\,(1/16)\right)$$

- $$-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$
$$=-\frac{3}{10^3}+1\Big/\left(\left(-\frac{1}{4}\log(a)\log_a(2)\sqrt{5-2\sqrt{5}}+\log(a)\log_a(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\log(a)\log_a(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)^\wedge(1/16)\right)$$

- $$-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$
$$=-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\frac{1}{4}\operatorname{Li}_1(-1)\sqrt{5-2\sqrt{5}}-\operatorname{Li}_1(0.0085)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}+\operatorname{Li}_1(0.0691)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}}}$$

$\log_b(x)$ is the base- b logarithm

$\operatorname{Li}_n(x)$ is the polylogarithm function

Series representations:

$$-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

$$=-\frac{3}{1000}+1\Bigg/\left(\left(\sum_{k=0}^{\infty}\left(\frac{1}{k!}(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5-\sqrt{5})\right)}{2\pi}\right\rfloor\right)\log(0.9915)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5-\sqrt{5}\right)\right)^k\sqrt{x}-\frac{(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg(5-x-2\sqrt{5})}{2\pi}\right\rfloor\right)\log(2)\left(-\frac{1}{2}\right)_k(5-x-2\sqrt{5})^k\sqrt{x}}{4k!}+\frac{1}{k!}(-1)^{1+k}x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5+\sqrt{5})\right)}{2\pi}\right\rfloor\right)\log(0.9309)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5+\sqrt{5}\right)\right)^k\sqrt{x}\right)\right)\wedge(1/16)\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

$$=-\frac{3}{1000}+1\Bigg/\left(\left(\sum_{k=0}^{\infty}\left(\frac{1}{k!}(-1)^k\log(0.9915)\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}(5-\sqrt{5})-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2-k+1/2\left\lfloor\arg\left(\frac{1}{2}(5-\sqrt{5})-z_0\right)/(2\pi)\right\rfloor}-\frac{1}{4k!}(-1)^k\log(2)\left(-\frac{1}{2}\right)_k\left(5-2\sqrt{5}-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg(5-2\sqrt{5}-z_0)/(2\pi)\right\rfloor}z_0^{1/2-k+1/2\left\lfloor\arg(5-2\sqrt{5}-z_0)/(2\pi)\right\rfloor}+\frac{1}{k!}(-1)^{1+k}\log(0.9309)\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}(5+\sqrt{5})-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2-k+1/2\left\lfloor\arg\left(\frac{1}{2}(5+\sqrt{5})-z_0\right)/(2\pi)\right\rfloor}\right)\right)\wedge(1/16)\right)$$

$$-\frac{3}{10^3}+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

$$=-\frac{3}{1000}+1\Bigg/\Bigg(\Bigg(-\frac{1}{4}\exp\left(i\pi\left\lfloor\frac{\arg(5-x-2\sqrt{5})}{2\pi}\right\rfloor\right)\sqrt{x}\left(2i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k(5-x-2\sqrt{5})^k}{k!}+\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5-\sqrt{5})\right)}{2\pi}\right\rfloor\right)\sqrt{x}\left(2i\pi\left\lfloor\frac{\arg(0.9915-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(0.9915-x)^k x^{-k}}{k}\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k x^{-k}\left(-\frac{1}{2}\right)_k(5-2x-\sqrt{5})^k}{k!}-\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5+\sqrt{5})\right)}{2\pi}\right\rfloor\right)\sqrt{x}\left(2i\pi\left\lfloor\frac{\arg(0.9309-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(0.9309-x)^k x^{-k}}{k}\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k x^{-k}\left(-\frac{1}{2}\right)_k(5-2x+\sqrt{5})^k}{k!}\Bigg)\text{^}(1/16)\Bigg)\quad\text{for }(x\in\mathbb{R}\text{ and }x<0)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

((-21/10^3-(2*3)/10^3))+1/((((((sqrt(((5-sqrt(5))/2))*ln(0.9915)-sqrt(((5+sqrt(5))/2))*ln(0.9309) – 1/4 *sqrt(((5)-2sqrt(5)))*ln(2)))))))^1/16

Input:

$$\left(-\frac{21}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

log(x) is the natural logarithm

Result:

1.647184356237079847321654271294381185873667683507787959350...

$1.6471843562\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternative representations:

$$\left(-\frac{21}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}} = -\frac{27}{10^3}+1\Big/\left(\left(-\frac{1}{4}\log_e(2)\sqrt{5-2\sqrt{5}}+\log_e(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\log_e(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\wedge(1/16)\right)$$

- $$\left(-\frac{21}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}} = -\frac{27}{10^3}+1\Big/\left(\left(-\frac{1}{4}\log(a)\log_a(2)\sqrt{5-2\sqrt{5}}+\log(a)\log_a(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\log(a)\log_a(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)\wedge(1/16)\right)$$

-

$$\left(-\frac{21}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$
$$=-\frac{27}{10^3}+\frac{1}{\sqrt[16]{\frac{1}{4}\operatorname{Li}_1(-1)\sqrt{5-2\sqrt{5}}-\operatorname{Li}_1(0.0085)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}+\operatorname{Li}_1(0.0691)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}}}$$

$\log_b(x)$ is the base- b logarithm

$\operatorname{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\left(-\frac{21}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$
$$=-\frac{27}{1000}+1\Bigg/\left(\left(\sum_{k=0}^{\infty}\left(\frac{1}{k!}(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}\left(5-\sqrt{5}\right)\right)}{2\pi}\right\rfloor\right)\log(0.9915)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5-\sqrt{5}\right)\right)^k\sqrt{x}-\frac{(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(5-x-2\sqrt{5}\right)}{2\pi}\right\rfloor\right)\log(2)\left(-\frac{1}{2}\right)_k\left(5-x-2\sqrt{5}\right)^k\sqrt{x}}{4\,k!}+\frac{1}{k!}(-1)^{1+k}x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}\left(5+\sqrt{5}\right)\right)}{2\pi}\right\rfloor\right)\log(0.9309)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5+\sqrt{5}\right)\right)^k\sqrt{x}\right)\right)^{\wedge}(1/16)\right)\quad\text{for } (x\in\mathbb{R}\text{ and }x<0)$$

$$\left(-\frac{21}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

$$=-\frac{27}{1000}+1\Big/\left(\left(\sum_{k=0}^{\infty}\left(\frac{1}{k!}(-1)^k\log(0.9915)\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2-k+1/2\left\lfloor\arg\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}-\frac{1}{4k!}(-1)^k\log(2)\left(-\frac{1}{2}\right)_k\left(5-2\sqrt{5}-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(5-2\sqrt{5}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2-k+1/2\left\lfloor\arg\left(5-2\sqrt{5}-z_0\right)/(2\pi)\right\rfloor}+\frac{1}{k!}(-1)^{1+k}\log(0.9309)\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2-k+1/2\left\lfloor\arg\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}\right)\right)\wedge(1/16)\right)$$

$$\left(-\frac{21}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\ \log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\ \log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\ \log(2)}}$$

$$= -\frac{27}{1000}+1\Bigg/\left(\left(-\frac{1}{4}\exp\left(i\pi\left\lfloor\frac{\arg(5-x-2\sqrt{5})}{2\pi}\right\rfloor\right)\sqrt{x}\right.\right.$$
$$\left(2i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)$$
$$\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k(5-x-2\sqrt{5})^k}{k!}+\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5-\sqrt{5})\right)}{2\pi}\right\rfloor\right)$$
$$\sqrt{x}\left(2i\pi\left\lfloor\frac{\arg(0.9915-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(0.9915-x)^k x^{-k}}{k}\right)$$
$$\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k x^{-k}\left(-\frac{1}{2}\right)_k(5-2x-\sqrt{5})^k}{k!}-$$
$$\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5+\sqrt{5})\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left(2i\pi\left\lfloor\frac{\arg(0.9309-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(0.9309-x)^k x^{-k}}{k}\right)$$
$$\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k x^{-k}\left(-\frac{1}{2}\right)_k(5-2x+\sqrt{5})^k}{k!}\right)\text{^}(1/16)\Bigg)\quad \text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

((-8/10^3+(-21*2)/10^3-(2*3)/10^3))+1/((((((sqrt(((5-sqrt(5))/2))*ln(0.9915)-sqrt(((5+sqrt(5))/2))*ln(0.9309) – 1/4 *sqrt(((5)-2sqrt(5)))*ln(2)))))))^1/16

Input:

$$\left(-\frac{8}{10^3}+\frac{-21\times 2}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

log(x) is the natural logarithm

Result:

1.618184356237079847321654271294381185873667683507787959350...

1.618184356…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$\left(-\frac{8}{10^3}+-\frac{21\times 2}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$
$$=-\frac{56}{10^3}+1\Big/\left(\left(-\frac{1}{4}\log_e(2)\sqrt{5-2\sqrt{5}}+\log_e(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\log_e(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)^\wedge(1/16)\right)$$

•

$$\left(-\frac{8}{10^3}+-\frac{21\times 2}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$
$$=-\frac{56}{10^3}+1\Big/\left(\left(-\frac{1}{4}\log(a)\log_a(2)\sqrt{5-2\sqrt{5}}+\log(a)\log_a(0.9915)\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\log(a)\log_a(0.9309)\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)^\wedge(1/16)\right)$$

•

$$\left(-\frac{8}{10^3}+-\frac{21\times 2}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

$$=-\frac{56}{10^3}+\frac{1}{\sqrt[16]{\frac{1}{4}\operatorname{Li}_1(-1)\sqrt{5-2\sqrt{5}}-\operatorname{Li}_1(0.0085)\sqrt{\frac{1}{2}(5-\sqrt{5})}+\operatorname{Li}_1(0.0691)\sqrt{\frac{1}{2}(5+\sqrt{5})}}}$$

$\log_b(x)$ is the base- b logarithm

$\operatorname{Li}_n(x)$ is the polylogarithm function

Series representations:

$$\left(-\frac{8}{10^3}+-\frac{21\times 2}{10^3}-\frac{2\times 3}{10^3}\right)+\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}(5-\sqrt{5})}\log(0.9915)-\sqrt{\frac{1}{2}(5+\sqrt{5})}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

$$=-\frac{7}{125}+1\Bigg/\left(\left(\sum_{k=0}^{\infty}\left(\frac{1}{k!}(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5-\sqrt{5})\right)}{2\pi}\right\rfloor\right)\log(0.9915)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5-\sqrt{5}\right)\right)^k\sqrt{x}-\frac{(-1)^k x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg(5-x-2\sqrt{5})}{2\pi}\right\rfloor\right)\log(2)\left(-\frac{1}{2}\right)_k(5-x-2\sqrt{5})^k\sqrt{x}}{4k!}+\frac{1}{k!}(-1)^{1+k}x^{-k}\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}(5+\sqrt{5})\right)}{2\pi}\right\rfloor\right)\log(0.9309)\left(-\frac{1}{2}\right)_k\left(-x+\frac{1}{2}\left(5+\sqrt{5}\right)\right)^k\sqrt{x}\right)\right)\wedge(1/16)\right)\quad\text{for } (x\in\mathbb{R}\text{ and } x<0)$$

$$\left(-\frac{8}{10^3}+-\frac{21\times 2}{10^3}-\frac{2\times 3}{10^3}\right)+$$

$$\frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\log(0.9915)-\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\log(0.9309)-\frac{1}{4}\sqrt{5-2\sqrt{5}}\log(2)}}$$

$$=-\frac{7}{125}+1\Big/$$

$$\left(\left(\sum_{k=0}^{\infty}\left(\frac{1}{k!}(-1)^k\log(0.9915)\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}\right.\right.\right.$$

$$z_0^{1/2-k+1/2\left\lfloor\arg\left(\frac{1}{2}\left(5-\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}-$$

$$\frac{1}{4k!}(-1)^k\log(2)\left(-\frac{1}{2}\right)_k\left(5-2\sqrt{5}-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(5-2\sqrt{5}-z_0\right)/(2\pi)\right\rfloor}$$

$$z_0^{1/2-k+1/2\left\lfloor\arg\left(5-2\sqrt{5}-z_0\right)/(2\pi)\right\rfloor}+\frac{1}{k!}(-1)^{1+k}\log(0.9309)$$

$$\left(-\frac{1}{2}\right)_k\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)^k\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}$$

$$\left.\left.\left.z_0^{1/2-k+1/2\left\lfloor\arg\left(\frac{1}{2}\left(5+\sqrt{5}\right)-z_0\right)/(2\pi)\right\rfloor}\right)\right)\hat{}\,(1/16)\right)$$

$$\left(-\frac{8}{10^3} + -\frac{21\times 2}{10^3} - \frac{2\times 3}{10^3}\right) + \frac{1}{\sqrt[16]{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\ \log(0.9915) - \sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\ \log(0.9309) - \frac{1}{4}\sqrt{5-2\sqrt{5}}\ \log(2)}}$$

$$= -\frac{7}{125} + 1 \Big/ \left(\left(-\frac{1}{4}\exp\left(i\pi\left\lfloor\frac{\arg\left(5-x-2\sqrt{5}\right)}{2\pi}\right\rfloor\right)\sqrt{x}\left(2i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k (2-x)^k x^{-k}}{k}\right)\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k \left(5-x-2\sqrt{5}\right)^k}{k!} + \exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}\left(5-\sqrt{5}\right)\right)}{2\pi}\right\rfloor\right)\sqrt{x}\left(2i\pi\left\lfloor\frac{\arg(0.9915-x)}{2\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k (0.9915-x)^k x^{-k}}{k}\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k x^{-k}\left(-\frac{1}{2}\right)_k \left(5-2x-\sqrt{5}\right)^k}{k!} - \exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{1}{2}\left(5+\sqrt{5}\right)\right)}{2\pi}\right\rfloor\right)\sqrt{x}\left(2i\pi\left\lfloor\frac{\arg(0.9309-x)}{2\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k (0.9309-x)^k x^{-k}}{k}\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k x^{-k}\left(-\frac{1}{2}\right)_k \left(5-2x+\sqrt{5}\right)^k}{k!}\right)\hat{}\,(1/16)\right) \quad \text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

From:

Anomalies in String Theory with D-Branes
Daniel S. Freed - Edward Witten
Department of Mathematics, University of Texas at Austin - School of Natural Sciences, Institute for Advanced Study - July 15, 1999

If so, we can predict how many net $D0$-branes will be produced – that is the difference between the number of $D0$-branes and anti-$D0$-branes in the final state. It must equal the $D0$-brane charge of the initial state, which [GHM,CY,MM] is

$$N_0 = \int_{Q_0} \sqrt{\hat{A}(Q)} \frac{1}{\sqrt{\hat{A}(\nu)}} \exp\left(c_1(\mathcal{L})\right),$$

where $\hat{A}$ is the total A-roof class, and $c_1(\mathcal{L})$ is the first Chern class of the "complex line bundle" $\mathcal{L}$ on which the "$U(1)$ gauge field" A of the D-brane is a connection. Now, using the fact that the tangent bundle of $\mathbb{R}^{10}$ is trivial, and splits as $TQ \oplus \nu$ (with TQ the tangent bundle to Q), we have $\hat{A}(\nu) = \hat{A}(Q)^{-1}$. So we rewrite the formula for the total $D0$-brane charge as

$$N_0 = \int_{Q_0} \hat{A}(Q_0) \exp\left(c_1(\mathcal{L})\right). \tag{1.14}$$

(We have written here $\hat{A}(Q_0)$ rather that $\hat{A}(Q)$; the two are equal as $TQ = TQ_0 \oplus \epsilon$, where ϵ is a trivial real line bundle that incorporates the "time" direction.)

Now, if $\mathcal{L}$ were a complex line bundle, then in general N_0 would not be an integer. For example, for $Q_0 = \mathbb{C}P^2$ and $\mathcal{L}$ trivial, we would have $N_0 = \pm 1/8$ (depending on orientation). When N_0 is not integral, the initial D-brane state cannot decay to known stable particles.

The curvature of the determinant line bundle is the 2-form

$$\Omega^{\operatorname{Det} D^{X/Z}(E)} = \left[2\pi\sqrt{-1}\int_{X/Z} \hat{A}(\Omega^{X/Z})\operatorname{ch}(\Omega^E)\right]_{(2)} \subset \Omega^2(Z), \tag{3.1}$$

where $\Omega^{X/Z}, \Omega^E$ are the indicated curvature forms. As for the holonomy, consider a loop $\pi\colon X \to S^1$ of manifolds in this geometric setup. Endow S^1 with a metric and the *bounding* spin structure; then we induce a metric and spin structure on X. The holonomy of the determinant line bundle around this loop is

$$\operatorname{hol}\operatorname{Det} D^{X/S^1}(E) = \text{a-lim}\, \tau_X^{-1}(E), \tag{3.2}$$

From (1.14) and (3.1), for $N_0 = 1/8$, we obtain

(((2*Pi(sqrt(-1))))) * 1/8

Input:

$$\left(2\pi\sqrt{-1}\right)\times\frac{1}{8}$$

Result:

$$\frac{i\pi}{4}$$

Decimal approximation:

0.7853981633974483096156608458198757210492923498437764552437... i

0.78539816…

Property:

$\frac{i\pi}{4}$ is a transcendental number

Polar coordinates:

$r \approx 0.785398$ (radius), $\theta = 90°$ (angle)

Alternate form:

$$\frac{\pi i}{4}$$

Series representations:

$$\frac{2}{8}\left(\pi\sqrt{-1}\right) = i\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

•

$$\frac{2}{8}\left(\pi\sqrt{-1}\right) = \sum_{k=0}^{\infty}-\frac{i(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times239^{1+2k}\right)}{1+2k}$$

•

$$\frac{2}{8}\left(\pi\sqrt{-1}\right) = \frac{1}{4}i\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations:

$$\frac{2}{8}\left(\pi\sqrt{-1}\right) = i\int_0^1 \sqrt{1-t^2}\, dt$$

- $$\frac{2}{8}\left(\pi\sqrt{-1}\right) = \frac{i}{2}\int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt$$

- $$\frac{2}{8}\left(\pi\sqrt{-1}\right) = \frac{i}{2}\int_0^\infty \frac{1}{1+t^2}\, dt$$

(((((2*Pi(sqrt(-1))/8)))^2

Input:

$$\left(2\pi\times\frac{\sqrt{-1}}{8}\right)^2$$

Result:

$$-\frac{\pi^2}{16}$$

Decimal approximation:

−0.6168502750680849136771556874922594459571062129525494141 5...

-0.61685027…

Property:

$-\frac{\pi^2}{16}$ is a transcendental number

Series representations:

$$\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = -\frac{3}{8}\sum_{k=1}^{\infty}\frac{1}{k^2}$$

- $$\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = \frac{3}{4}\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

•

$$\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = -\frac{1}{2}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = -\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

•

$$\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = -\frac{1}{4}\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

•

$$\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = -\frac{1}{4}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

-1/(((((2*Pi(sqrt(-1))/8)))^2

Input:

$$-\frac{1}{\left(2\pi\times\frac{\sqrt{-1}}{8}\right)^2}$$

Result:

$$\frac{16}{\pi^2}$$

Decimal approximation:

1.621138938277404343102071411355642222469740394755944781529...

1.6211389…

Property:

$\frac{16}{\pi^2}$ is a transcendental number

Series representations:

$$-\frac{1}{\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2} = \frac{1}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}$$

- $$-\frac{1}{\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2} = \frac{1}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4\times 239^{1+2k}\right)}{1+2k}\right)^2}$$

- $$-\frac{1}{\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2} = \frac{16}{\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}$$

Integral representations:

$$-\frac{1}{\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2} = \frac{1}{\left(\int_0^1 \sqrt{1-t^2}\, dt\right)^2}$$

- $$-\frac{1}{\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2} = \frac{4}{\left(\int_0^{\infty} \frac{1}{1+t^2}\, dt\right)^2}$$

- $$-\frac{1}{\left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2} = \frac{4}{\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt\right)^2}$$

-3/10^3-1/(((((2*Pi(sqrt(-1))/8)))^2

Input:

$$-\frac{3}{10^3} - \frac{1}{\left(2\pi\times\frac{\sqrt{-1}}{8}\right)^2}$$

Result:

$$\frac{16}{\pi^2} - \frac{3}{1000}$$

Decimal approximation:

1.618138938277404343102071411355642222469740394755944781529...

1.61813893…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Property:

$-\frac{3}{1000} + \frac{16}{\pi^2}$ is a transcendental number

- **Alternate forms:**

$$-\frac{3\pi^2 - 16000}{1000\pi^2}$$

-

$$\frac{16000 - 3\pi^2}{1000\pi^2}$$

Series representations:

$$-\frac{3}{10^3} - \frac{1}{\left(\frac{2\pi\sqrt{-1}}{8}\right)^2} = -\frac{3}{1000} + \frac{1}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2}$$

-

$$-\frac{3}{10^3} - \frac{1}{\left(\frac{2\pi\sqrt{-1}}{8}\right)^2} = -\frac{3}{1000} + \frac{1}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1+2k}\right)^2}$$

-

$$-\frac{3}{10^3} - \frac{1}{\left(\frac{2\pi\sqrt{-1}}{8}\right)^2} = -\frac{3}{1000} + \frac{16}{\left(\sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)\right)^2}$$

Integral representations:

$$-\frac{3}{10^3} - \frac{1}{\left(\frac{2\pi\sqrt{-1}}{8}\right)^2} = -\frac{3}{1000} + \frac{1}{\left(\int_0^1 \sqrt{1-t^2}\, dt\right)^2}$$

-

$$-\frac{3}{10^3} - \frac{1}{\left(\frac{2\pi\sqrt{-1}}{8}\right)^2} = -\frac{3}{1000} + \frac{4}{\left(\int_0^{\infty} \frac{1}{1+t^2}\, dt\right)^2}$$

•

$$-\frac{3}{10^3}-\frac{1}{\left(\frac{2\pi\sqrt{-1}}{8}\right)^2}=-\frac{3}{1000}+\frac{4}{\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2}$$

-1+(((((2*Pi(sqrt(-1))/8)))^2

Input:

$$-1+\left(2\pi\times\frac{\sqrt{-1}}{8}\right)^2$$

Result:

$$-1-\frac{\pi^2}{16}$$

Decimal approximation:

−1.6168502750680849136771556874922594459571062129525494141 5...

-1.61685027…

Property:

$-1-\frac{\pi^2}{16}$ is a transcendental number

55/10^3+1-(((((2*Pi(sqrt(-1))/8)))^2

Input:

$$\frac{55}{10^3}+1-\left(2\pi\times\frac{\sqrt{-1}}{8}\right)^2$$

Result:

$$\frac{211}{200}+\frac{\pi^2}{16}$$

Decimal approximation:

1.6718502750680849136771556874922594459571062129525494141 50...

1.67185027…

We note that 1.671159628... is a result practically equal to the value of the formula:

$m_{p'} = 2 \times \frac{\eta}{R} m_P = 1.6714213 \times 10^{-24}$ gm

that is the holographic proton mass

Property:

$\frac{211}{200} + \frac{\pi^2}{16}$ is a transcendental number

-

Alternate form:

$\frac{1}{400}(422 + 25\pi^2)$

Series representations:

$$\frac{55}{10^3} + 1 - \left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = \frac{211}{200} + \frac{3}{8}\sum_{k=1}^{\infty}\frac{1}{k^2}$$

-

$$\frac{55}{10^3} + 1 - \left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = \frac{211}{200} - \frac{3}{4}\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

-

$$\frac{55}{10^3} + 1 - \left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = \frac{211}{200} + \frac{1}{2}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{55}{10^3} + 1 - \left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = \frac{211}{200} + \left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

-

$$\frac{55}{10^3} + 1 - \left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = \frac{211}{200} + \frac{1}{4}\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

-

$$\frac{55}{10^3} + 1 - \left(\frac{1}{8}(2\pi)\sqrt{-1}\right)^2 = \frac{211}{200} + \frac{1}{4}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

From the previous expression:

$$\Delta \ell n U = 8 \frac{i\pi}{2} (\eta_\alpha(D) - \eta_\beta(D)) \bmod 2\pi i \qquad (25)$$

$i\pi\eta_\alpha(D) / 2 = 1; \quad i\pi\eta_\beta(D) / 2 = -1$

8 mod 2Pi*i + 8 mod 2Pi*i

((((((((8 mod 2Pi*i) + (8 mod 2Pi*i))))))))

$8 \bmod (2\pi i) + 8 \bmod (2\pi i)$

$16 - 8\pi$

−9.13274122871834590770114706623602307357735519500084656779...

-9.13274122…

Inserting the absolute value of result 9.13274122 as radius in the Hawking radiation calculator, we obtain:

Mass = 6.150609e+27

Radius = 9.132741

Temperature = 0.00001995255

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(6.150609e+27)* sqrt[[-((((0.00001995255 * 4*Pi*(9.132741)^3-(9.132741)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{6.150609\times 10^{27}}\sqrt{-\frac{0.00001995255\times 4\pi\times 9.132741^3-9.132741^2}{6.67\times 10^{-11}}}}}$$

Result:

1.6182492537822207323689686091958030520510119281593100070 42...

1.618249…

And:

1/ sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(6.150609e+27)* sqrt[[-((((0.00001995255 * 4*Pi*(9.132741)^3-(9.132741)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{6.150609\times 10^{27}}\sqrt{-\frac{0.00001995255\times 4\pi\times 9.132741^3-9.132741^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.61795177576184260991274303325900553443684773148423016712 1...

0.6179517…

Furthermore:

55/10^3-2/10^3 + sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(6.150609e+27)* sqrt[[-((((0.00001995255 * 4*Pi*(9.132741)^3-(9.132741)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{55}{10^3}-\frac{2}{10^3}+\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{6.150609\times 10^{27}}\sqrt{-\frac{0.00001995255\times 4\pi\times 9.132741^3-9.132741^2}{6.67\times 10^{-11}}}}}$$

Result:

1.6712492537822207323689686091958030520510119281593100070 42...

1.67124925378…. result very near to the below proton mass:

We now proceed to calculate the rest mass of the proton as above, utilizing the new muonic hydrogen measured proton charge radius $r_p = 0.84184 \times 10^{-13} cm$ and find $\eta = 4.340996 \times 10^{40}$, $\eta_p = 9.448222 \times 10^{35} gm$, and $R = 1.130561 \times 10^{60}$. Again utilizing equation (24) we obtain

$$m_{p'} = 2\frac{\eta_p}{R} = 1.6714213 \times 10^{-24} gm . \qquad (25)$$

Inserting the absolute value of result 9.13274122 as entropy in the Hawking radiation calculator, we obtain:

Mass = 2.815816e-8

Radius = 4.181069e-35

Temperature = 4.358250e+30

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.815816e-8)* sqrt[[-(((((4.358250e+30 * 4*Pi*(4.181069e-35)^3-(4.181069e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1 \Bigg/ \left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{2.815816 \times 10^{-8}} \sqrt{-\frac{4.358250 \times 10^{30} \times 4\pi (4.181069 \times 10^{-35})^3 - (4.181069 \times 10^{-35})^2}{6.67 \times 10^{-11}}} \right)}$$

Result:

1.618249178442156858564632765392054707711256436804403191648...

1.61824917…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.815816e-8)* sqrt[[-((((4.358250e+30 * 4*Pi*(4.181069e-35)^3-(4.181069e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1\Bigg/\left(\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.815816\times 10^{-8}}\sqrt{-\frac{4.358250\times 10^{30}\times 4\pi\,(4.181069\times 10^{-35})^3-(4.181069\times 10^{-35})^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951804531532023039279926329688521696643101618611459762...

0.6179518…

References

Rogers, L. J.; Ramanujan, Srinivasa (1919), **"Proof of certain identities in combinatory analysis."**, *Cambr. Phil. Soc. Proc.*, **19**: 211–216, Reprinted as Paper 26 in Ramanujan's collected papers

Bruce C. Berndt, Heng Huat Chan, Sen-Shan Huang, Soon-Yi Kang, Jaebum Sohn, Seung Hwan Son, ***The Rogers-Ramanujan Continued Fraction***, J. Comput. Appl. Math. **105** (1999), pp. 9–24.

Berndt, B. et al. **"The Rogers–Ramanujan Continued Fraction"**, http://www.math.uiuc.edu/~berndt/articles/rrcf.pdf

Berndt, B. et al. **"The Rogers–Ramanujan Continued Fraction"**